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CATCHING'S COMPENDIUM

OF

PRACTICAL DENTISTRY

For 1896.

B. H. CATCHING, D. D. S.
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OPERATIVE DENTISTRY.

TO OPEN A BLIND ABSCESS.

DR. A. C. HART.

Odontological Journal.

With a small swab apply a drop of trichloracetic acid on the gum over the apex of the root; twist the swab gently, applying more acid till the alveolus is reached; with a spear-pointed drill go through the alveolus to the sac; with a swab apply carbolic acid (Calvert's No. 1, full strength), thoroughly permeating the tumor; if necrosis is present, enlarge the opening and get direct contact with the diseased bone; syringe out the tract with pyrozone, and pump in concentrated lactic acid; saturate a small tampon of cotton with campho-phenique and aristol, and leave in the opening for two or three days till connective tissue begins to form.

TO PLACE COTTON IN FISTULOUS ABSCESS.

DR. G. A. BRONSON, ST. LOUIS.

Dental Digest, May.

Pain and trouble can be avoided, and a cotton cone carried positively to the bottom of the opening, by dipping a gutta-percha point in chloropercha and, while still sticky, wrapping it with cotton to make a cone. Then, when the cotton is on, dip the tip end in the solution, and it will go to the bottom every time, with the least amount of pain to the patient.

LINING CAVITIES FOR AMALGAM WITH TIN.

Dental Digest, April.

Dr. S. B. Palmer says that if cavities that are to be filled with amalgam are lined with tin-foil, the dentine will not be discolored, and the filling will not shrink.

GOLD BANDAGE FOR SAVING TEETH.

DR. J. F. ADAMS, WORCESTER, MASS.

The Dental Digest, January.

The bandage, as its name implies, is designed to envelop the tooth, covering all those parts where decay is liable to occur, as well as those which have already been attacked, existing cavities having first been filled with oxyphosphate cement. It is thus prophylactic as well as remedial. Take for example a superior bicuspid, though the bandage may be used on any of the anterior teeth, and if the patient has a large mouth it might be applied to the first molar, but the bicuspids are the teeth for which it will oftenest be demanded. If the tooth be in close contact with its neighbors, first pass a No. 00 separating file between them, which makes just space enough to admit the bandage without any crowding of the teeth, and then introduce a wedge on either side and separate freely. When this is accomplished slip a rubber ring over the tooth, allowing it to impinge slightly on the gum to force it away from the neck of the tooth. The ring is made from a short section of rubber tubing, which is trimmed at one end to an edge by placing it on a mandrel and pressing sandpaper against it while it is revolving in the hand-piece of the engine. Common, cheap tubing is best for the purpose, as pure rubber is too soft for the sandpaper to act upon.

Drill a slot on its labial face one eighth of an inch, or perhaps less, in length, starting very slightly above the gum-line, one sixteenth of an inch in width, and as deep as it is safe to go, making an undercut with a wheel or inverted cone bur, and to insure a neat operation the lower end of the slot, this being a superior bicuspid, should be carefully squared, otherwise it will be apparent where the ends of the bandage are connected. Next with a knife-edged disk cut a notch transversely on the palatal face of the tooth near the cusp, so as to give a good, firm rest for the gold which is to be fitted into it. Apply the rubber dam and prepare the cavities. The only excavating which is demanded is simply what is necessary for the removal of the decay, as the shape of the cavity is of no consequence. Fill with oxyphosphate, restoring the contour, and wait for the cement to set, then smooth with polishing strips and remove the dam.

Take an impression and make a fusible metal cast upon which to form the bandage. This is made of pure gold, 34 gauge. When it is fitted approximately to the cast, try it in the mouth, place it as nearly as possible in the proper position, and while holding it firmly between the thumb and finger, with a burnisher press the gold into the notch in the palatal face of the tooth so that it will exactly fit and fill it. Remove the bandage and fill up the depression with 22 k. gold solder, return to the tooth and burnish it down to a fit. Cut the ends so that they will fit into the buccal slot, leaving them just long enough to reach the bottom. Then remove and finish. The part which comes next to the gum should be trimmed to a knife edge and made perfectly smooth. Next give the gold a final annealing and it is ready to set. After again applying the dam and drying the tooth, cover the inner surface of the bandage with a thin coating of soft cement, place it in position and secure with a ligature wound several times around, and while the cement is still soft burnish perfectly to the tooth, place the ends into the slot, forcing them up against the side-walls, and fill the slot with gold. The fitting of the tongue or flap which is to cover the crown surface may be done as a separate operation. If the decay included only one proximal surface and the fissure in the crown, there will be only one flap, which will cover the entire length of the fissure. Drill a small hole at the further extremity of the fissure, apply fresh cement to the under side of the flap, burnish it down, press the point into the hole and fill that with gold. If the original cavity included both proximal surfaces and the crown, you have two flaps meeting in the middle of the crown where the anchorage is made.

When the tooth is exposed to view, leave as much of the labial surface uncovered as is consistent with the strength of the bandage. After smoothing and polishing, and securing a correct occlusion by grinding away any point of the opposing tooth that may strike the gold, the operation is complete.

VARNISH FOR CAVITIES.

A varnish composed of rosin dissolved in chloroform, is excellent for lining cavities in which gutta-percha is to be used as a filling. It causes the material to adhere to the walls of the cavity. Applied to cavities in which cement is to be used, and the chloroform allowed to evaporate, it makes an excellent lining, or pulp protector.

HOLDING DAM OUT OF WAY.

DR. A. F. MERRIAM, SAN FRANCISCO.

Stomatological Gazette, April.

In placing rubber dam over a number of the anterior teeth in the superior maxilla while operating upon the lingual aspect, the dam frequently gets in the way, and by extending it from the first bicuspid on one side to the first bicuspid on the other, and by passing the ligature about the neck of one bicuspid across the mouth and back, it can be held so as to prevent any interference. An additional point is that, after the dam has been placed over a number of teeth and interferes, instead of punching another hole, simply press the rubber over and around the tooth and place a clamp about the neck, thus preventing the interference of moisture, which is incidental to the puncture of the rubber. Use square molar or bicuspid clamps in placing the rubber, placing the clamp through the perforation in dam, then folding the rubber about the clamp-pliers and pulling rubber over the clamp.

HERBST DAM RETRACTOR.

MR. W. R. HUMBY.

British Journal Dental Science, October.

The rubber dam is adjusted in the usual manner, in the present case exposing eight of the anterior teeth; the dam secured by clamps on the first bicuspid on either side.

The rubber is carried up between the teeth by a thread, the tooth to be stopped is thus in view, and it only requires the Herbst needle to be applied, so that the gum and dam may be held out of the way that work on the cervical portion of tooth may be proceeded with.

The needle in use is one made from a broken bur, the latter being ground to a fine point, on the side of a carborundum wheel, by gentle pressure and rotation. The latch end is broken off, and any roughness at fracture smoothed away.

The point is inserted beneath the free edge of the dam and passed upward until the needle point has passed by the seat of caries, and the sound cement is felt to have been reached.

Until now the direction of the point has been upwards and backwards; when the true position is believed to be attained, the direction is changed so that the needle stands out at right angles to the cement—the position to be retained throughout the operation.

Securing the needle is very simple. One of the fingers of the left hand is placed on the projected rounded end of the needle, while the forefinger and thumb of the right grasp the middle, so as to release the left hand from its hold on needle. The left hand thus being free, it is used to stretch the dam forward and draw it over the end of needle; the rubber, by its contraction towards the teeth pulls the needle into firm contact with the cement. According to Dr. Herbst this is the only hold the needle requires, but in consequence of a tendency to displacement, it is better to have a clip, such as are used for fastening neckties, passed under the rubber from the upper surface and made to grip the needle through the rubber.

The clip is thus presented edgeways to the patient's face; to prevent local pressure a piece of domed metal is attached to edge of the clip by soft soldering. This addition resting against the lip secures the needle in position, and leaves both hands free during the greater part of the operation. If the mallet or disk is used, it is better to give the needle a little support by gently pressing it, but this precaution is only occasionally required.

The advantages are: the entire absence of pain; the very rapid adjustment of dam and needle, averaging two minutes; the entire freedom from any obstruction to cavity; no laceration of gum, and no blood is drawn, the only evidence of any operation being a small red mark where the side of the needle rested against the gum margin; and there is no need for any ligature.

TO RETRACT THE DAM IN LABIAL CAVITIES.

Dental Review, November.

For retracting the dam out of the way in filling labial or buccal cavities, Dr. Taggart uses very small steel wedges or pins, which, being too small and short to handle with the fingers or pliers, they are carried to place by an instrument with a hole drilled in the end, and the instrument magnetized, which holds the small points. They are set in position in the cementum above the cavity and a tap on the instrument drives them in sufficiently to withstand the traction of the dam. They are put in before the dam is placed on.

DISK LUBRICANT.

DR. J. A. ROBINSON, MORRISVILLE, VT.

Written for The Compendium.

The best lubricant for disks and strips is coco-butter. The taste and odor is much better than vaselin and it is much nicer to handle. It is excellent for corundum wheels when grinding a tooth for crowning.

FINISHING AMALGAM FILLINGS.

Dental Review, May.

Strips of the finest mull, says Dr. T. W. Pritchett, are excellent for finishing amalgam fillings.

SILK TAPE FOR FINISHING AMALGAM FILLINGS.

Ash's Quarterly.

Silk tape for finishing amalgam fillings is recommended by Mr. Peabody. The material being very thin, will pass into close places, and very fine texture, it leaves a fine finish on the amalgam.

AMALGAM AND GOLD FILLING.

A good suggestion is made by Dr. C. E. Kells, of New Orleans. It is that if a tooth is to be filled with amalgam, and an exposed part with gold, to first place gutta-percha where the gold is to be and proceed to fill with amalgam. At another sitting remove the gutta-percha and fill with gold.

AMALGAM AND GOLD FILLING.

DR. F. T. VAN WOERT, BROOKLYN.

Ohio Dental Journal, December.

In deep subgingival approximal cavities, the best way to apply the dam is to cut one hole large enough in the rubber to permit of its being stretched over the two teeth; next, with a curved needle, pass a piece of silk floss through both sides of the dam at the point where it can be used to draw the same together between the cavities and tie; dry as near as possible, then warm enough modeling compound to fill both cavities, and after coating carve from one of the teeth sufficient to form a matrix; now fill that portion of the cavity below the gum line with amalgam, building to about 1-32d of an inch above it, and while yet soft add gold in soft pellets with a burnisher, until it ceases to show the absorption of mercury. Finish by condensing the balance with a mallet in the regular manner.

One point to be remembered before beginning the condensation of the gold as last stated, is to cut away the compound from the margins to the point where the burnishing ceased, that the adaptation may be made without the aid of a matrix.

The advantage of a filling of this kind over one made entirely of gold is that a perfect joint is made at a point with the amalgam, which in most cases would be impossible to accomplish with gold, for a number of reasons too plain for description. If the operation is properly performed, it is very difficult to distinguish such a combination from its neighbors of pure gold.

AMALGAM AND GOLD FILLINGS IN THE SAME TOOTH.

DR. S. D. PALMER, SYRACUSE, N. Y.

Ohio Dental Journal, March.

When gold and amalgam or other metal filling is placed in the same tooth, no harm will arise when the cavities are on opposite sides of the tooth, and even cavities may be filled upon the coronal surface with different metals, provided the enamel border is strong between and the separation some distance. Should the cavities be large, or so located that the two metals would be within the distance of eighteen or twenty, plate gage, cut away the separating wall and make a bold connection; for this reason, the nearer the plates, the less resistance and stronger the current. Thus the intervening portion is likely to be decomposed; when the two fillings are in contact there is no current to leave the metals, and there is never a separation between gold and amalgam, as we often find between amalgam fillings in perfect contact. In the case of the gold and amalgam, the soldering at the union contains gold which enters into the amalgam, and thus that union, however thin it may be, is finer than the amalgam plug throughout, consequently there can be no separation, while on the other hand, with the amalgam filling, the union contains more mercury than the plugs on either side, and the joint becomes the positive element to be dissolved.

A remedy consists in placing one thickness of gold-foil in the joint. This is lost sight of by amalgamation, but the fineness remains to raise the potential above the amalgam, so there is no separation. One case of approximate fillings will illustrate the principle for treatment to prevent galvanic currents. The most frequent annoyances occur when cavities are filled between bicuspids or molars in teeth with sensitive dentine. The saliva and remnants of food become decomposed, the current arising therefrom forms a current through the dentine and pulps. We formerly were obliged to remove one of the fillings. This may be obviated by lining the cavity with an insulator. The effect is this: the drying of the cavity destroys sensitiveness, to the depth of the surface deprived of moisture; when the surface so dried is filled with varnish, paraffine, etc., neither moisture nor sensitiveness returns. This furnishes a more durable insulator than chloropercha, which does not penetrate far into the dentine. Besides, chloropercha linings expand and remain flexible, and in some instances by hard biting upon the plugs, the fluid in the dental tubes is made to feel the pressure or convey sensation to the pulp. Linings need not be as thick as some might imagine. If the cavity is well dried, any of the resinous varnishes will penetrate sufficiently deep to prevent moisture from returning to the plug. In no case nor with any lining should the varnish occupy the space between the filling and the enamel border so as to be worn away and admit moisture. Besides, it is difficult to build out or contour gold upon varnished enamel. Gutta-percha fillings do not need a lining to prevent thermal changes, but a varnish lining improves a gutta-percha filling as much as any other material. When balsam is applied, the warm filling renders it very thin; a portion enters the dentine, and the rest forms a compound with the filling; each piece remains fixed, and when once packed, the filling never leaks or separates from the walls until scraped away with an excavator.

AMALGO-CEMENT FOR DECIDUOUS OR FRAIL TEETH.

While this filling mixture is not new, yet the combination is of enough value to call attention to it. Mix amalgam to fill the cavity, add to it one-third cement powder, and thoroughly incorporate it. Then, on a slab, mix the mass with the cement liquid to the consistency of putty, and fill. It is excellent for temporary teeth.

CEMENT FILLING.

DR. F. T. VAN WOERT, BROOKLYN.

Ohio Dental Journal, December.

The prevailing mistake in the use of cement is in the method of mixing. If care is taken to incorporate the powder with the fluid in such quantities as to insure a perfectly smooth mass, and not stiff enough to lose its adhesive qualities, a very much more serviceable and lasting filling will be made. Another great mistake is, the continued working at the filling during the process of its setting. To obtain the best results, it should be allowed to stand from ten to fifteen minutes; at the end of which time, it should be shaped and polished as per gold, then coated with a thick varnish made of Canada balsam or collodian, understanding of course, that all precautions are taken in the beginning of the operation to protect the parts with the dam, etc., just as in the manipulation of gold. Under such conditions, very satisfactory and profitable results will be obtained.

PROTECTION FOR CEMENT FILLINGS.

Equal parts of rosin and wax is said to make a most excellent protection for cement fillings.

PROTECTING CEMENT FILLINGS.

Stomatological Gazette, February.

For protecting cement fillings until they are thoroughly hard, Dr. Lundborg uses crystal chloride zinc. He places a crystal on the filling and allows it to melt. The filling will receive a good polish. Resin and paraffin are recommended for the same purpose.

SMOOTH CEMENT FILLINGS.

Cement fillings often have a rough feel and disagreeable taste for several days after insertion. These can be prevented by covering them with wax, or what is better, spermaceti, using a warm burnisher to rub it on.

CEMENT FILLINGS WITH MATRIX.

When a matrix is used in filling with cement, it should, before being withdrawn, be pushed slightly toward the gum. This prevents drawing the cement away from the cervical wall, if it sticks to the matrix as it frequently does, though it may have been oiled.

GOLD FILLINGS FINISHED WITH GOLD-PLATINUM FOIL.

It is the practice of Dr. H. J. McKellops, of St. Louis, to finish large front gold fillings with gold-platinum foil. A filling so finished is hardly noticeable a short distance from the tooth.

GUTTA-PERCHA FILLING.

DR. F. T. VAN WOERT, BROOKLYN.

Ohio Dental Journal, December.

Prepare the cavity in the usual way, drying thoroughly with the hot-air syringe, then varnish the inner surface with chlorobalsam and place the gutta-percha of small pellets, packing with instruments heated from ten to fifteen degrees warmer than the pellets are when taken from the warming plate. The best device for warming gutta-percha, and not over-heating it, is to place it on a small plate or metal slab over boiling water, and the instruments with their points immersed in water, which gives about the required difference between the two.

The filling should be allowed to stand from ten to fifteen minutes before polishing, which should be done very carefully so as not to cause the pulling away from the margins. If the direction of the force required is from the center to the circumference, that is to say, if in using a disk it is made to revolve so that the surplus is carried from the center of the filling surface to the cavity margin, such heat as is generated by the friction will consolidate the material at the point where it is most needed, namely: the cavity margin.

Chloroform should never be used for finishing; it dissolves the gutta-percha and leaves a rough, granular surface, principally of zinc oxid, which soon becomes so coated with the mouth secretions as to be a detriment to everything surrounding it, and filthy in the extreme. If allowed to get hard, trimmed carefully, polished with cuttle disks, and lastly burnished, results are obtained that would be impossible in any other way.

TRIMMING GUTTA-PERCHA FILLINGS.

International Dental Journal, May.

The trimming of such fillings is accomplished nicely, says Dr. Geo. S. Allen, by using small sickle-shaped knives. They can be made from old excavators. The edges must be smooth and kept sharp. The shape will allow them to be passed around a tooth easily.

TEMPORARY FILLINGS.

Dental Review, December.

An excellent suggestion is made by Dr. Garrett Newkirk, of Chicago, with reference to temporary fillings preparatory to permanent fillings. He says where there are several cavities to be filled in the same mouth, those most in need of filling are excavated quite to a finish and filled with gutta-percha. Such fillings are left undisturbed quite a while as test fillings. He did not mention the fact, but it is a good one, that such fillings placed in large approximal cavities in bicuspids and molars, will space those teeth nicely for proper contour operations.—ED. COMPENDIUM.

TIN AND GOLD FOR FILLING.

DR. SPRING, DRESDEN, GERMANY.

Dental Review, February.

The writer recommends five parts of gold to one of tin, prepared in the following manner: Lay down one sheet of Abbey's non-cohesive gold-foil No. 6; upon this place a sheet of No. 4; upon this a sheet of S. S. White's globe tin-foil No. 4; upon this another sheet of Abbey's non-cohesive gold-foil No. 4; and upon this a sheet of No. 6. Cut into five strips and crimp. The crimped strips are cut into pieces a little longer than the depth of the cavity to be filled. Some of these pieces are rolled into cylinders between the thumb and finger. Others are left open because easier to use in starting a filling. The color of this combination is slightly less yellow than pure gold, but thoroughly pleasing and satisfactory. This combination hardens just as rapidly as when the proportions are one to one. An accurate test would probably prove that it does not become quite so hard, but the difference is so slight that with an excavator you cannot detect it. Suffice it to say, it will stand all that is required of it in the mouth, as experience proves.

PACKING GOLD WITH IVORY POINTS, ALSO WITH PAPER FOLDED OVER THE GOLD.

Dental Practitioner and Advertiser, July.

Twenty-four years ago Dr. Shumway, of Plymouth, Mass., demonstrated a method of working gold for filling purposes with ivory pointed instruments. He has recently confirmed the benefits of the method to Dr. Frances of New York. With such points, he says, the gold is better adapted to the cavity walls and its cohesive properties better maintained. The same writer says Dr. Register, of Philadelphia, has demonstrated the working of gold under two or three folds of bibulous paper with steel instruments. The paper is folded smoothly and cut into small pieces, and over each piece of gold placed in the cavity a piece of fresh paper is laid, and the pressure is made on the paper. Dr. Register claims better adaptation than with instruments alone.

The same writer reports Mr. Leslie, an old gold manufacturer, as saying that the life or spirit of the gold is knocked out by too much force in packing.

PULP CAPPING.

DR. GORDON WHITE, NASHVILLE, TENN.

Dental Cosmos, February.

The writer reports marvelous success, his method is given as follows:

Before the operation is commenced the patient rinses the mouth with as warm water as can be used comfortably, to which is added a little alcohol or a few drops of some antiseptic. The cavity is then washed with warm water from the syringe, and the excavation begun in the usual way. Occasionally, or as required, the cavity is wiped out with a small pledget of cotton saturated with chloroform. When it is prepared for the capping, with a small pair of scissors and foil-pliers, they having been sterilized with hot water, a small piece of paper from a prescription blank is cut to fit approximately the point to be capped, or the entire bottom of the cavity, if preferred. This paper cap is dipped into chloroform, which, of course, quickly evaporates, leaving it with its original stiffness and, for this purpose, sufficiently sterilized. On one side of the piece of paper, with a small pointed instrument, sterilized of course, place the smallest particle of the chloropercha solution in which has been dissolved fifty grains of aristol to the ounce of chloroform.

This forms nothing more nor less than a little plaster. The cavity having been previously wiped out with chloroform, which leaves it dry, this little plaster is turned on to the exposure and gently pressed into position with the smallest piece of spunk.

On this cap are now thrown a few draughts of hot air, which soon evaporates the chloroform from the paste, leaving the cap rather securely stuck to its position. Over this is placed a little thin cement, and, when hard, over this cement capping is inserted whatever filling is desired.

Dr. J. H. McKellops reports equally as good success by using a cap cut from asbestos paper and covered with a paste of iodoform and glycerol, with the same precautionary measures.

CELLULOID FILMS FOR PULP CAPS AND POLISHING STRIPS.

DR. DWIGHT M. CLAPP, BOSTON.

Written for The Compendium.

The celluloid films are used by photographers. By placing the films—those that have been spoilt in exposing, or otherwise—in warm water, the emulsion is easily removed, leaving a flexible, almost transparent substance.

They are of two kinds: the cut films and the roll. They are alike with the exception of thickness. The cut being about like a common visiting card, and the roll like thin writing paper.

The thicker makes excellent nerve caps. By laying it on a piece of stationers' rubber, and warming a burnisher, round end of an excavator or anything that will give the right shape, and pressing it on the celluloid, a slight depression is made. After trimming this with scissors to fit the cavity, the depression can be filled with any material desired, and placed over the exposure. The little concave cap makes an excellent protection for the nerve. By soaking the film in spirits of camphor it becomes softened and easily takes the form of the cavity. A good way to handle the cap is to touch the point of a fine excavator in sandarac varnish, when the cap will be found to stick to it sufficiently to be carried into place.

The roll, or thin films, make the best polishing strips that can be found for carrying pumice or other powders, for finishing fillings, and more especially for cleansing and polishing the proximal surfaces of the front teeth. The celluloid is soft enough so that it takes up the pumice and carries it along with it, thereby making it much more effective than floss, silk or tape. It is surprising into what small spaces these celluloid strips will go, also how long they will last, when seemingly so fragile.

PULPOL, A MEDICATED CEMENT FOR CAPPING AND ISOLATING PULPS AND FOR TEMPORARY FILLINGS.

JOHN WESSLER, STOCKHOLM, SWEDEN.

Odontologisk Tidskrift.
Translated for The Compendium by Dr. Sjoberg.

This preparation—the chief ingredients of which are oxid of zinc and eugenol—is a compound totally different from all other cement preparations hitherto used. There is in Pulpol no trace of chlorid of zinc, phosphoric acid, or any other substance pharmacodynamically related thereto. Pulpol cement, when mixed, contains about 30 per cent. eugenol.

Pulpol is a mild and non-irritant cement, and a bad conductor of heat. It is, further, a powerful antiseptic, and an effective anodyne, and at last it is a good absorbent.

It is chiefly intended for capping pulps, and renders it possible, at one sitting and by a single manipulation, to cap and simultaneously isolate (so that a special covering of gutta-percha or ordinary cement is superfluous) both healthy and irritated exposed pulps.

In suitable cases the preparation may be used with success as a permanent capping for an exposed and partially inflamed pulp, even though the pulp has not been previously treated.

This medicated cement may be applied as a capping to pulps, amputated according to Witzel's method.

As a non-conducting covering in deep and sensitive cavities, Pulpol may be warmly recommended as an obtundent and antiseptic cement.

It is specially adapted for temporary fillings, particularly in very sensitive cavities, for in such cases the sensibility is diminished, and moreover the preparation, unlike the hard oxychlorid fillings, is easily excavated.

This preparation can be used for root-fillings, though it is best for this purpose to use the liquid and diamond coal.

The liquid calls for special attention in consequence of its surprising obtunding properties on diverse painful affections arising from a wounded or inflamed pulp.

Sometimes the patient feels a slight twinge immediately after the Pulpol has been applied to the tooth; this is, however, transitory, and of no importance if the capping has been properly performed and applied without pressure.

On applying the Pulpol to an exposed pulp, it is absolutely necessary that the mass is of due doughy consistency which enables the preparation to well out over the pulp. If improper pressure be exercised on insertion, irritation of the pulp ensues and the entire operation is a failure.

If the mixing is duly performed, the excavating necessary for the removal of the superfluous Pulpol may be commenced five to fifteen minutes afterwards, and a plastic filling may then be inserted subsequently.

When a pulp is to be capped that is not perfectly healthy, the entire cavity should be filled with Pulpol, and results awaited for a week or two.

If a gold filling is to be inserted above the Pulpol, the preparation of the cavity—i. e., freeing it from superfluous Pulpol, should be deferred till the following day at very earliest, and should the mass nevertheless seem too little set for the purpose—opinions vary greatly in this respect—a thin layer of oxyphosphate may be inserted above it.

An essential merit in Pulpol is that it hardens, irrespective of whether the surface is protected from saliva or no. The preparation having once been inserted, moisture may immediately be allowed access without the filling being damaged in the slightest degree.

If desired, the Pulpol liquid (one drop) can be mixed with other liquid germicides (one drop or less), as formalin, carbolic acid, oil of cinnamon, etc.

DEVITALIZING PULPS.

Southern Dental Journal, April.

Before applying arsenic for the destruction of a pulp, anesthetize the point of exposure by holding in contact with it a pellet of cotton, dipped in hot carbolic acid. If the decomposed dentine is properly removed and the pulp fully exposed, a small pin's head size of arsenic is sufficient.

DEVITALIZING PULPS.

DR. CHAS. W. JENKINS, ZURICH, SWITZERLAND.

The Written for Compendium.

Pain following the application of arsenic to the pulp may be avoided by mixing the arsenic (so-called cobalt, not arsenious acid) and an equal amount of cocain (crystals). Since adopting this combination, seven years ago, the writer has had no case of severe pain, and rarely any pain at all, in destroying pulps. Cover with cement and avoid pressure.

INFLAMMATION OF PULPS.

To reduce inflammation preparatory to arsenical application: Apply peroxid of hydrogen; then on a whisk of cotton, take up bicarbonate of soda and place in cavity loosely, and saturate the surrounding parts with chloric ether; cover the cotton with sandarac varnish. After this treatment the pulp is less liable to give pain from arsenic.

TO PROTECT PULP WHILE CHISELING CAVITIES.

Items of Interest, June.

Dr. J. K. Moose, Lenoir, N. C., says pack cotton or bibulous paper in deep-seated, sensitive cavities, to catch the point of the instrument when chiseling down the edges.

ANESTHETIC FOR REMOVAL OF PULPS.

Dental Office and Laboratory, September.

Dr. D. V. Beacock says, one grain of cocain dissolved in one drahm of chloroform is excellent for injecting into the pulp for painless removal.

COCAIN IN PULP REMOVAL.

DR. W. D. BILLMEYER.

Dental Headlight.

Adjust rubber dam and gain free access to exposure. Apply freely a paste made of wood creosote and cocain crystals ground to powder. Fill cavity with beeswax and press down gently but firmly with finger, forcing cocain into pulp. After first slight twinge of pain there will be no further sensation. Remove wax, open up pulp chamber and remove pulp, which will usually be thoroughly deadened. If not, repeat cocain application.

COCAINING PULPS FOR REMOVAL.

If free access is had to pulps, they can be completely anesthetized by injecting a ten per cent. cocain solution into the pulp chamber and canals. To do this effectively use a smooth point on the syringe, stop the back flow of the cocain solution by packing around the point with cotton, dental rubber, or gutta-percha.

Force the piston and wait a few seconds, then force it again. A small quantity of the solution injected into the pulp chamber and canals will suffice.

FILLING ROOT-CANALS.

DR. W. E. WALKER, BAY ST. LOUIS, MISS.

Dental Register, July.

Dr. Walker uses dressing-seal, with creosote worked into it, working it on a warm metal slab with a warm spatula. When the creosote is thoroughly incorporated, it is made into rolls and introduced into the canal with cold instruments and followed by hot air.

ROOT-CANAL FILLING.

Dr. A. W. Harlan says gutta-percha filling will cling more closely to the sides of the canal if the canals are washed with ammonia water (one-half per cent. dilution).

ROOT FILLING, CAVITY LINING, PULP CAPPING.

DR. MAX SICHEL, SAN FRANCISCO.

Stomatological Gazette.

℞	Celluloid shavings	1 oz. bottle, one-fourth full.
	Ether	2 drams.
	Alcohol	1 dram.

A few drops of etherial oil.

IMMEDIATE FILLING OF DISEASED ROOT.

Dental Review, February.

Dr. W. S. Davenport says, when there is a discharge of thin pus from a root-canal followed by blood, he does not hesitate to fill such at once, after the hemorrhage is stopped.

FILLING ROOTS WITH WAX.

DR. T. C. STELLWAGEN, PHILADELPHIA.

Dental Cosmos, September.

In speaking of the use of wax as a permanent root filling he says it is unirritating and will penetrate into all the canals, especially in the lower teeth, where there is so much trouble. His method of inserting it is to warm a probe and push down into the canals a little pencil of wax. If for a permanent filling, he forces down into the wax little gold points, which are cut off and finished, and the root is filled with gold and lined with wax. He has yet, in a year's time, to have any trouble with teeth so treated. He can see no reason why the wax should not last as long as the tooth, and by the method described, he succeeds in making a perfectly air-tight and water-tight filling.

ROOT FILLING MATERIAL.

Dental Review.

Mix powdered carbonate of lead with salicylate of soda and sufficient water to manipulate as an osteoplastic, rolling it into fine points. It fits nicely into canals and sets very hard. The carbonate of lead is a perfect antiseptic.

LINING ROOT-CANALS WITH SILVER NITRATE.

DR. L. P. BETHEL, KENT, OHIO.

Ohio Dental Journal, September.

With the current of a cataphoric apparatus, Dr. Bethel lines root-canal with silver nitrate. The solution used is from forty to seventy per cent.

The process of application is a simple one. Adjust the rubber dam, and if the crown of the tooth needs protection from discoloration, apply a thin coating of melted wax to the surface of the crown cavity, then apply the silver nitrate solution to the canal by means of a wooden toothpick or other suitably-shaped piece of wood, pump the solution into the canal with a broach as thoroughly as possible, apply the electrode to the pulp-canal opening, place a pellet of cotton saturated with the silver nitrate solution around the electrode in the canal, and the electricity does the rest. The saturated cotton turns first a light green, which grows darker until almost black, and serves as an indicator.

The time of application will vary according to the condition of the root-canal, its size, whether well opened, strength of current, and per cent. solution used. The higher per cent. solution, the better conductor it makes and the quicker it is deposited. From one to five minutes seems to be ample time. After removing the electrode cleanse the pulp-cavity and canal as thoroughly as possible with dilute ammonia, to neutralize the nitric acid formed, and it also hastens the darkening of the nitrate. Then dry with hot air.

In the majority of practical cases he has been using the nitrate of silver after the root-canal has been sterilized, although in several cases it was used without previous sterilization, the cavity sealed, and no further trouble experienced.

This root-canal lining is not advocated for all teeth; indeed, the practitioner must use judgment in its application. It would not be advisable in the anterior teeth on account of discoloration, or teeth where the foramen is large, as in teeth not fully developed, and others on account of the liability of forcing it through the apex of the root.

ROOT-CANALS MEDICATED BY JAPANESE WOODEN TOOTHPICKS.

DR. T. C. STELLWAGEN, PHILADELPHIA.

Dental Cosmos, September.

The writer says that for the past year he has been using an appliance so simple that he could hardly hope to hold attention to it. He sharpens the ordinary Japanese wood toothpicks to correspond to the size of the canals, and puts them into a jar of the medicaments he is using—some, for instance, in a strong solution of carbolic acid, some in crystals of carbolic acid. These toothpicks, when kept in the solution, become very flexible, and can be worked up into a very tortuous canal. It may not be possible to get to the foramen with them, but you can get as far as is necessary. After washing out the cavity with water, go on and cleanse the canal with the toothpick, then perhaps with alcohol, then, after it is perfectly dry, use the medicament indicated. He often cuts off the pick and leaves it in the canal for a while, but usually he fills at once.

OPENING ROOT-CANALS.

The best instrument to use in connection with sulphuric acid diluted for opening root-canals is a Donaldson canal-cleaner, fastened into a convenient handle. The withdrawal of the instrument after each insertion brings out the debris. No steel instrument should be long used with the acid; they become brittle and are liable to break off in the roots. The strength of the instrument should be tested before each use of it.

PLACING CEMENT IN ROOT-CANALS.

There is nothing better for placing cement in root-canals, preparatory to placing a pin in the canal, than wooden toothpicks. They are useful for carrying soft cement to many cavities.

PEROXID SODIUM USED DRY IN ROOT-CANALS.

DR. H. H. BURCHARD, PHILADELPHIA.

Dental Cosmos, May.

The writer prefers to use the sodium dry instead of solution as has been the custom. He says: The rubber dam is applied and the canals freely opened; a fine iridium broach, which has been roughened, is dipped in the sodium peroxid powder and carried into the canal dry; each canal is treated to three or more applications. In a few moments effervescence indicates the chemical change consequent upon bringing this salt in contact with putrefying matter. The action of this agent is less violent than that of the kalium-natrium, and quite as effective. As soon as effervescence ceases the canals are washed out with a weak solution of sulphuric acid, dried, and other applications of the sodium salt made.

[Donaldson canal-cleaners will answer the purpose of introducing the sodium.—Ed. Compendium.]

TO REMOVE GUTTA-PERCHA FILLINGS FROM ROOTS.

Items of Interest, October.

Dr. Freeman says to remove gutta-percha filling from roots, heat the gutta-percha filling with hot air syringe and then introduce a warm instrument and remove it.

BROKEN INSTRUMENT REMOVED FROM ROOT-CANAL.

DR. B. H. CATCHING, ATLANTA, GA.

The head of a Gates-Glidden drill was broken off in the root-canal of a superior lateral incisor, about half way up. To remove it, the canal was much enlarged to the broken piece. A four-sided, sharp-pointed drill was made of the broken instrument. A small hole was drilled by the side of the obstruction. Into the hole a Donaldson canal-cleaner, repeatedly dipped in seventy-five per cent. sulphuric acid, was worked back and forth, with lateral pressure, which removed tooth substance from around the broken piece. A forcible discharge of water from a hypodermic syringe into the canal brought the piece out.

DRY SOCKETS.

Dental Cosmos, November.

Dr. J. Y. Crawford calls attention to what he terms dry sockets. It is an alveolus that remains open and dry long after the tooth is extracted. Sometimes severe pain is located in and about such alveoli. No positive remedy is suggested. Enlarging the alveolus by cutting and actual cautery have been tried with some success.

MODELING COMPOUND AS TEMPORARY STOPPING.

Dr. G. V. N. Relyea, of Oswego, N. Y., says in the Dominion Dental Journal, that modeling compound makes an excellent stopping.

BLEACHING TEETH.

DR. H. C. REGISTER, PHILADELPHIA.

Dental Cosmos, February.

The writer, after drying the cavity, applies a solution of sulphuric acid, about six per cent., then saturates the cavity with tincture iodin, and washes out with ammonia water. In cases of very extensive discoloration, after having used the above, he uses sodium peroxid or hydrogen peroxid.

SECTION OF RUBBER TUBING FOR CLEANING TEETH.

Dominion Dental Journal, May.

Dr. Lennox, of Toronto, uses instead of a rubber cup, a piece cut from rubber tubing, one end of which is slipped on port-polisher or other suitable instrument. The other end projecting for abrading purposes.

FILLING PULPLESS DECIDUOUS TEETH.

Dr. Cravens removes the contents of the canals as thoroughly as possible; wipes out with aristol, then pumps in phosphate of lime in the magma state, works into this soft mass dry phosphate of lime, and fills the cavity with any desirable filling.

DEVITALIZING AND FILLING DECIDUOUS TEETH.

DR. L. L. DUNBAR, SAN FRANCISCO.

Stomatological Gazette, March.

When it is deemed necessary to destroy the pulps, carefully make an application of cobalt rubbed up in oil of cloves, directly to the exposed surface, cover with gutta-percha, and at an early sitting (not later than forty-eight hours) remove the application and enlarge the canal opening with a round bur, after which pick out all the remaining pulp-tissue as carefully as may be; dry out the canal and fill it up with iodoform crystals, either in a menstruum of eugenol or with the Blair vaporizer. Over this can be flowed salol by melting the crystals with the aid of a hot-air instrument, though this latter is not necessary. The cavity can then be filled with the assurance of no further trouble.

TREATING AND FILLING DEVITALIZED TEETH.

DR. C. A. FIRTH, QUEANBEYAN, N. S. W.

Dental Cosmos, May.

In an article on this subject, the writer gives some very practical ideas. His method in the front teeth is to remove the pulp entirely, if possible, by means of a Donaldson broach; apply the rubber dam, and twist a few shreds of cotton around a fine Swiss broach, the temper to be previously drawn; dip the cotton in a fifty per cent. solution of peroxid of sodium (Na_2O_2), and thoroughly cleanse the canal by repeated applications of the solution; wash the cavity out with alcohol (using a hypodermic syringe to get into the canals), dry same with hot air blown through a Richmond hot-air syringe by means of a foot-bellows, then insert an Evans root-drier in canals, and they are ready for filling. The preparation which he uses with the greatest satisfaction is salol in combination with about five per cent. of either iodoform or thymol. The latter he believes to be the best.

The preparation is melted at as low a temperature as possible; a minute quantity of cotton is made hot by holding it over a spirit-lamp, and dipped into the melted salol compound and quickly carried up the canal to the apex by means of a fine Swiss broach; now fill the rest of the canal by injecting the same preparation by means of a hot hypodermic syringe; wait a few minutes to allow the salol compound to set, wipe surplus away, then line cavity with thin cement, and fill cavity with either amalgam or gold, placing the first portions in position while the cement is soft.

In treating teeth having putrescent pulps, he finds that the fifty per cent. solution of Na_2O_2 is the best preparation to get the canals thoroughly clean. The Na_2O_2 forms a sort of soap with the fatty constituents of pulp-matter, and is easily removed by repeated syringing with warm water. In cases of abscess he follows the above treatment, and injects a few drops of aromatic sulphuric acid through the canal into the abscess sac; then dry canals, and dress them with wood creosote, and cover with temporary stopping for three days. At the next visit apply rubber dam, remove dressings, wash the cavity out with H_2O_2, five per cent.; then use alcohol; dry and dress again with wood creosote for a week. By that time the tooth is generally ready for filling. The canals are filled as described previously. In cases where a remnant of the pulp is left, he uses the following for filling the roots, which acts as a mummifier: Thymol, tannin, glycerol, equal parts to make paste.

TREATING TEMPORARY TEETH.

British Journal Dental Science, October.

In writing on this important subject, Mr. Bates says, for destroying the pulps of such teeth, cotton dipped in carbolic acid and sealed in the cavity will prove efficient in twenty or thirty days. On opening the cavity, the pulp will be found bright red and will bleed at the slightest touch, but scarcely at all sensitive. He removes the pulp from the chamber and the largest canals, but does not attempt removal from small canals. The chamber is filled with iodoform and wax, or cotton vaselin and iodoform. A filling is inserted which can be easily removed, if necessary.

SEPARATING TEETH.

DR. H. H. GANTZ.

Use a little piece of sea-tangle tent, wedged tightly in the cavity or between the teeth. It is much nicer than rubber and does not produce nearly so much soreness of the teeth.

RUBBER DAM FOR SEPARATING TEETH.

British Journal Dental Science.

A small piece of rubber dam is twisted and drawn between the teeth, the ends cut off.

WASH TEETH WITH ALCOHOL BEFORE FILLING.

Dental Review, December.

An excellent suggestion is made by Dr. Garrett Newkirk, of Chicago, about washing teeth with alcohol. He says after the dam is on and before the final finish is given to the cavities, soak a piece of cotton in alcohol, hold it in pliers and wash the entire exposed surfaces of the teeth to be operated upon. They will shine with a lustre of cleanliness not before seen. All agglutinous matter is thereby removed before proceeding with the finishing and filling of the cavities.

PROSTHETIC DENTISTRY.

TO GET BITE OF ARTIFICIAL TEETH.

DR. J. A. ROBINSON, MORRISVILLE, VT.

Written for The Compendium.

If the patient is wearing an upper set of artificial teeth, and desires a lower set, to get a correct hard bite of the upper teeth is often difficult. And to avoid retaining the upper set for articulating purposes, take the plate, warm some modeling compound and press the teeth down into it; cool, remove the teeth from compound and pour the imprints of the teeth with plaster, thus making a plaster model for articulating purposes. Place the rim of articulating wax on lower jaw, have the patient to make indentation in it with the upper teeth, remove the wax rim, set on articulator. Set the plaster model with teeth in the indentations and attach it to the articulator.

GUIDE TO TAKING BITE.

Dominion Dental Journal, July.

After the wax rims are trimmed to proper contour and length, cut away sufficient wax in front to allow two sections of gum teeth to be fitted into position, or for plain teeth if they are to be used. These sample teeth are to be set exactly as the teeth on the plate are to go.

PARTIAL BITE-PLATE.

DR. W. STORER HOW, PHILADELPHIA.

Ohio Dental Journal, October.

There is a class of cases in which the provision of partial dentures, embracing only molars and bicuspids, tasks the skill of the prosthetician in no slight degree. This is especially true in the construction of bridge dentures which are to span places between molars and bicuspids, or molars and cuspids. For the convenient taking of impressions for these dentures Dr. H. H. Burchard has designed two suitable trays, Figs. 1 and 2, which have dual functions; that shown by Fig. 1 serving for either the upper left or the lower right side, while that illustrated by Fig. 2 may be used for either the upper right or the lower left side, as the case may require.

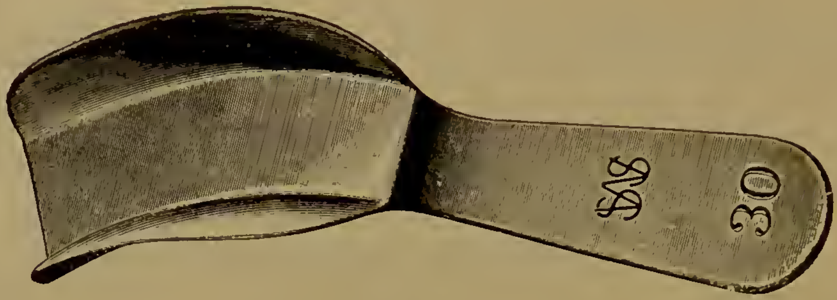


FIG. 1.

By no means the least of the difficulties encountered by the dentist is found in the subsequent taking of the bite, and incidentally there has commonly been for both patient and prosthetician the loss of time involved in the necessity for a second sitting to secure a correct bite.

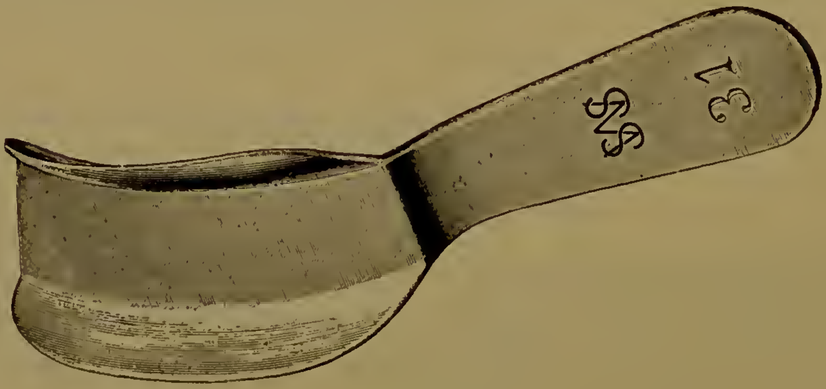


FIG. 2.

The desire to overcome these difficulties has induced the writer to supplement his true bite-plate series with the novel forms shown in Figs. 3 and 4. Like the new impression trays, these bite-plates are adapted for interchangeable uses: Fig. 3 for the lower left or the upper right side, and Fig. 4 for the upper left or the lower right side.

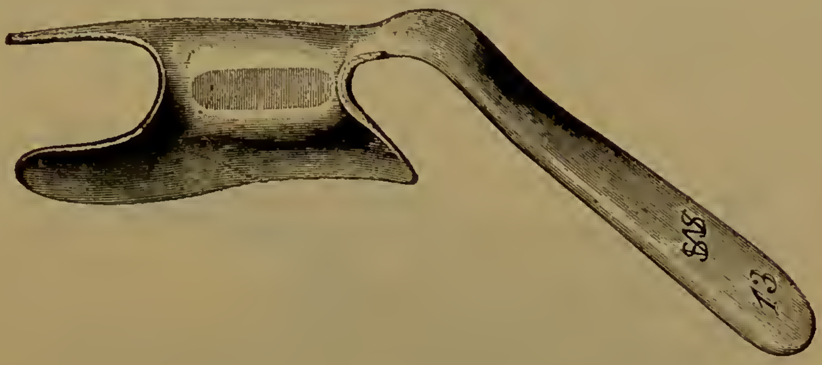


Fig. 3.

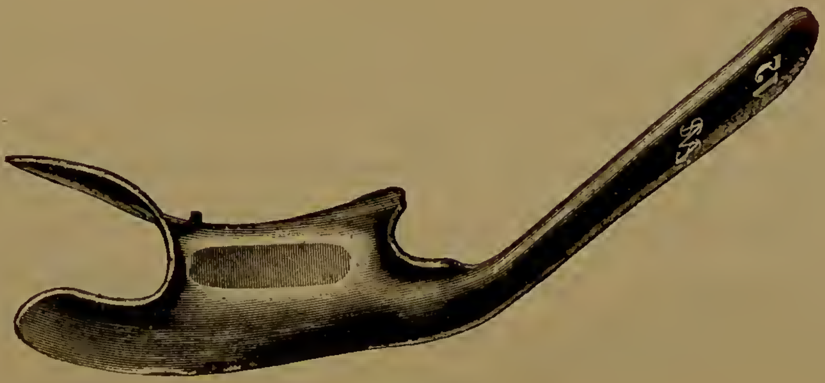


Fig. 4.

For example, a case may be taken in which only the third molar and the first bicuspid with the oral teeth of the lower right side remain. Immediately after taking the impression with the Fig. 2 tray, the bite-plate Fig. 3 is to be tried in the mouth and, if necessary, trimmed or bent to rest loosely on the gums between

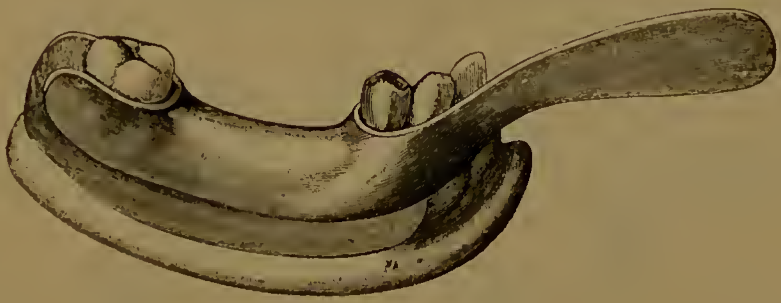


Fig. 5.

the lower and right third molar and first bicuspid. The teeth are then occluded to make evident the non-impingement of the upper teeth upon the bite-plate at any point.

Some thin warmed wax is to be placed on the under side of the warmed bite-plate, which is then pressed into place as shown in Fig. 5, and the teeth again brought together to be sure that they do not strike the bite-plate.

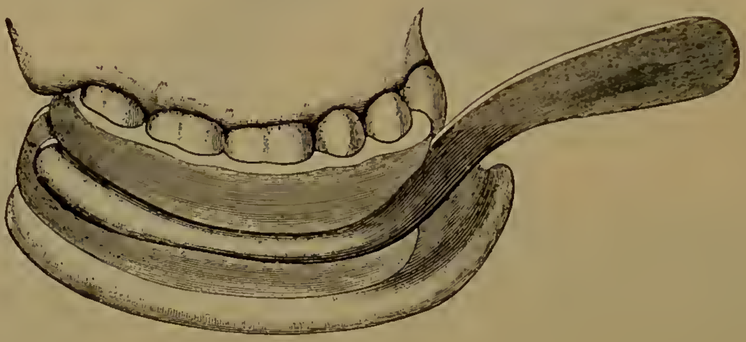


FIG. 6.

A sufficiently large roll of warmed wax is then placed on the hot bite-plate between the molar and bicuspid, and the upper teeth carefully closed upon and into it, as in Fig. 6. While the teeth remain closed, finger pressure on the buccal aspect of the wax will insure its conformation to the buccal surfaces of the teeth. A careful removal of the plate from the widely opened mouth will disclose a perfect bite, as in Fig. 7, which should at once be immersed in cold water and kept there until a plaster model shall have been made from the impression. The bite-plate and the bite

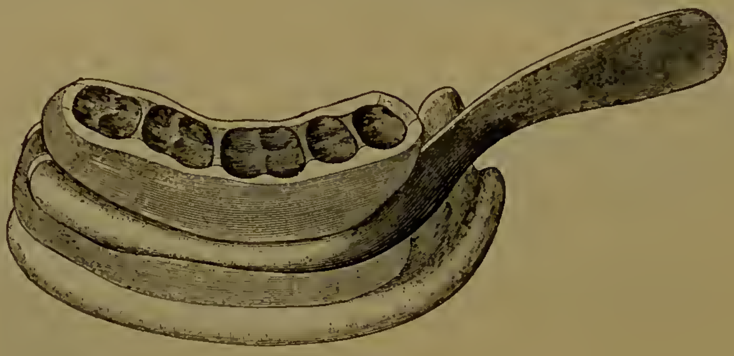


FIG. 7.

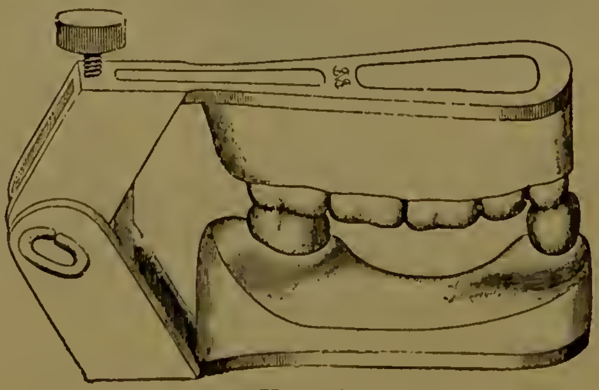


FIG. 8.

may then be judiciously placed on the model and both transferred to the articulator, with the result shown in Fig. 8. The like process is pursued in obtaining the bite at the original sitting for the impression in any similar case, whether the space to be filled is located above or below on either side. If the space extends only between, say the second molar and first bicuspid, the bite-plate may easily be made to fit by cutting away the posterior molar part with plate nippers or a vulcanite file, as shown in Figs. 9 or 10.

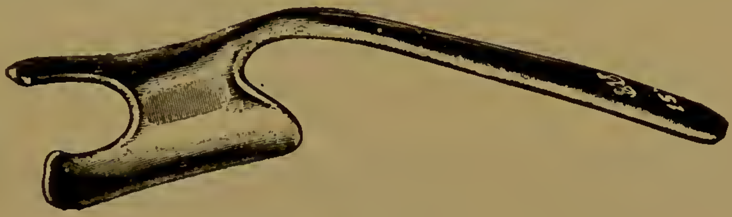


Fig. 9.

The anterior or bicuspid part need seldom be changed, but in every instance the bite-plate should be tried in, and the upper teeth be closed to be sure that they do not touch the bite-plate. The handle can easily be bent laterally to meet any indication.

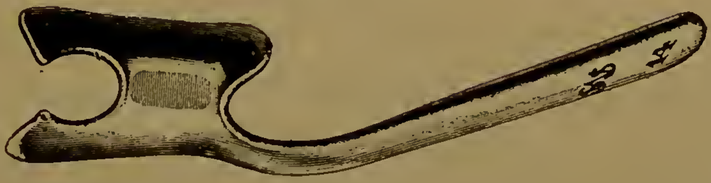


Fig. 10

The thin sides may be readily flared by hand-pressure over a smooth round wood handle to widen any part of the bite-plate to suit a special case. The ends and edges of the sides can be trimmed off to suit flat gum ridges or close bites; the bite-plates in form and amplitude of thin metal, having been made with a carefully considered design to provide for facile adaptations to the exigencies of prosthetic practice in this class of cases. The hope is ventured that the endeavor will meet corresponding professional approval.

TAKING BITE.

DR. CHARLES W. JENKINS, ZURICH, SWITZERLAND.

Written for The Compendium.

For many years Dr. W. F. Frauenfield, Switzerland, has not taken the final bite of a full lower denture until the upper set has been made and fitted in. He says an apparently correct articulation may be very deceptive, while the teeth of both sets are in the wax.

ARTIFICIAL DENTURES, FITTING.

DR. W. C. BARRETT, BUFFALO, N. Y.

Dental Practitioner and Advertiser, July.

Young practitioners in dentistry are always exceedingly anxious concerning the fit or adaptation of their first artificial dentures, and when they do not prove to be satisfactory and are too easily displaced in practical use, the failure is ascribed to a lack of adaptation; another impression is taken and the plates re-made, while the great probability is that the lack of success in many cases is due to mal-occlusion, rather than to a poor fit. An upper plate is inserted in a mouth in which there are but the anterior lower teeth. No special provisions are made to secure a direct occlusion, but the natural lower teeth are made to close against the lingual side of the artificial teeth, or the sloping surface of the plate. Of course such an inclined plane must force the denture forward until adhesion is lost, when it falls in the mouth.

If there are natural bicuspids and molars below, the artificial teeth may be so adjusted that they slide upon some projecting point, or the inclined surface of a natural tooth, and any force that is then used in mastication has the natural tendency to drive the denture out of its place, either posteriorly or anteriorly. Perhaps there is an inclined plane upon both sides, and the plate with a direct adhesive force of five or six pounds, is expected to retain its place against an oblique energy of thirty or forty pounds.

Every dentist knows that in the natural denture no tooth falls into line exactly opposite another, but rather breaks joints with it, the first lower pre-molar shutting between the upper cuspid and the first upper pre-molar, this arrangement being preserved throughout. Each tooth in that case is prevented from sliding upon its antagonist, and is firmly held without effort. If cuspids or premolars were to occlude point to point, there would not be force enough in the jaws to prevent them from sliding either one way or the other. Therefore, in arranging artificial teeth, especial care should be taken to see that there are no inclined planes of occlusion, or if one is found to be unavoidable, another in the opposite direction should be arranged to counteract it.

An artificial tooth should never be arranged to bite directly upon another. That is, their vertical axes should never be in line. Perfect occlusion is impossible when this is the case, and their occluding surfaces must either be ground down flat, or they will slide forward or backward. Each tooth must bite upon two opposite ones. The cusps are so fashioned that they naturally fall into place between the opposite teeth, and thus interlock in a manner that prevent sliding when they are in contact.

Sometimes it is difficult to arrange this when artificial teeth occlude with natural ones, but it can always be secured either by changing the arch of the artificial teeth, by leaving a space between them, or by carrying the center a little to one side. Of course, when gum section teeth are used, the spaces between them cannot be changed at will, and that is why good mastication cannot be as well secured with them as with single plain teeth. But the arch or center can be so changed as to make occlusion comparatively good.

Another reason why artificial dentures are sometimes failures, is that the parts representing the alveolus present to the muscles a convex instead of a plain or concave surface. When the lip must fall over a rounded contour, the natural tendency of both the longitudinal and transverse fibers of the orbicularis oris muscle and those of the others which blend with it, is to force the plate down. Let the surface of the plate that is under the lip be flat, the upper border not being filed or ground down to a knife edge.

The same rule should be followed in shaping the surfaces against which the lateral borders of the tongue rest. They should even be concave, that the tongue may lie easily in the space, and assist in holding the denture in place. Much of the difficulty in speaking that sometimes follows the insertion of artificial teeth, is due to the unnecessary thickness of the plate at the points representing the lingual alveolus over the roots of the pre-molars and molars. In making rubber plates, too much material is used where it is not needed for strength, and the plate is thus rendered heavy, clumsy, inartistic, and difficult of retention.

Many dentists, especially those who are young in practice, wax their rubber cases too far toward the points of plain teeth. Those that are just about long enough to reach to the alveolar ridge should be selected, and then upon their labial aspect they should be waxed only high enough barely to engage their external base. It is much easier to finish them, they look far more artistic, and they are lighter. The incisive and canine fossæ should be well marked, to afford a proper lodging place for the decussating fibers of the buccinnator, and for the longitudinal fibers of the levator muscles. The margin in these regions must be cut down, while the canine eminence is marked by carrying it higher in that locality. When these rules are observed the plate will not only be more artistic in appearance, but it will be retained in position much more easily.

METAL DIES DIRECT FROM IMPRESSION.

DR. I. E. WOODBURY, COUNCIL BLUFF, IA.

Dental Cosmos, August.

The writer says: In the old process of sand molding there were several transfers, and each step involved changes and defects. In this process there are but two transfers—first, the impression, and, second, the pouring and pressing down of the molten metal. In the new process the metal is poured in a semi-plastic condition, and tamped in the mold to avoid the spheroiding involved in the old procedure, when the metal had to be poured very hot. The material for the impression is fine clay, or a clay compound, with an equal part of plaster, which is the aluminous compound he uses.

It will not shrink nor expand. It is also a good investment for soldering. He uses a perforated tray, made in parts, composed of an alloy of two per cent. of copper with aluminum. This will stand the heat of the temperature at which the metal is poured. It is perforated for drying and permitting the escape of steam. Any die metal may be used, but he prefers Pastel's Babbitt metal and lead and tin for the counter-die. The flasks are made in three parts. The impression is held in the lower part, filling in around it with the investment compound. The middle part of the flask is made to hold the metal. The impression is trimmed to relieve pressure in the proper places, for the metal model cannot be trimmed afterward. After drying and heating the investment portion, the Babbitt metal is melted to mere fluidity, then stirred to make it plastic, poured into the impression, and tamped down well to make it fill all portions well and prevent spheroiding. It is cooled in water; dry it well, and smoke to prevent adhesion, and pour the counter-die metal. There are four special advantages in the process: the short time required to make the die; the low temperature at which the metal can be poured; all irregularities can be sharply taken; and the ease of the process by which even a novice can get good results at once.

FLASKING AND VULCANIZING.

DR. W. S. HOW, PHILADELPHIA.

Dental Cosmos, May.

The vulcanizing process is a simple one, but the production of good dental vulcanite is very unusual, because the art in its seeming simplicity is commonly deemed to require but little thought or skill. It is, however, a great mistake to jump to that conclusion, for the making of a fine, strong, solid, odorless vulcanite denture demands careful, intelligent attention to many essential details.

The plaster model should be smooth and hard. The waxing up is to be done neatly and of the right thinness for the vault-part, with a judicious thickness of the ridge and gum parts, which are commonly much too thick. They therefore get unequally vulcanized, as the thin parts and thick parts will not evenly harden at the same high heat in the same short time. This is a fundamental fact of the first importance, and its general neglect accounts for the porous malodorous dentures so often seen and smelt.

A large flask (the Griswold is the largest and best) should be chosen, and with thick-mixed plaster, free from bubbles, the model is set at an angle, as in Fig. 1, to insure safety to an overhanging anterior ridge, making the parting line along the waxed gum border. Shellac varnish the smooth plaster investment, and when dried oil the parting surface and pour thick mixed plaster for the mold, jarring the flask to drive the plaster over all the teeth and wax surfaces. Warm the flask and allow time for the heat to reach and soften the wax, so that the teeth will not be dislodged on separating the flask. Remove the wax and pour boiling water over the model and mold, to melt and wash out the remaining wax. Then with alcohol and a camel's-hair pencil brush the exposed teeth and pin surfaces to dissolve the wax or water film, which otherwise will prevent adhesion of the vulcanite; and here is disclosed a common cause of loose teeth, the breaking of unsupported teeth and of foul plates. That film also prevents a close fit of the cement stopping of section joints, and allows the vulcanite to flow between the cement and the sections to make a dirty joint. To provide for the surplus rubber a deep circular groove is cut in the mold-part, leaving a narrow rim between the model and the groove, as 4, Fig. 1; also shown in Fig. 2. This allows a free flow of the rubber until the flask is nearly closed, when the flow is checked by the narrow rim, and then the increased pressure distributed over the

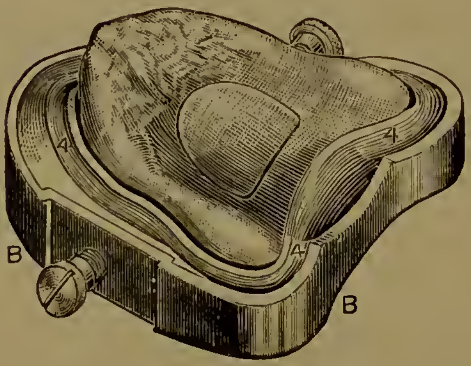


Fig. 1.

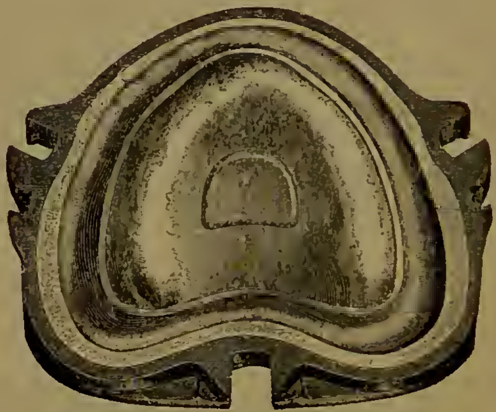


Fig. 2.

inclosed rubber drives it into every part of the mold and increases the density of the resulting vulcanite.

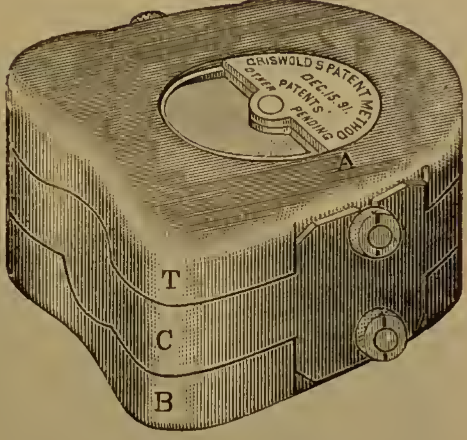


FIG. 3.

It is best to shellac varnish the model and mold (taking great care to keep the varnish from the teeth), and when the shellac dries sticky, burnish tin-foil over both model and mold, using a keen-edged knife to cut the foil close around the teeth. This work nicely done will, on stripping off the foil after vulcanization, leave a dense, smooth surface, needing very little finishing work. More than that, the surface will be hard and very resistant to the penetration of the oral fluids, or the retention of salivary or alimentary deposits.

A novel and important function of the Griswold flask, Fig 3, peculiarly adapts it for flasking cases wherein the gum-sections or single teeth have been arranged or ground to fit directly upon the ridge of the model. It is obvious that if the parting line is made between the two parts of the common flask in the usual way, leaving the teeth in the mold-part as shown in Fig. 4, a complete closure of the flask will probably fracture the thin gum of the section (or the thin neck of the plain tooth) by contact with the ridge of the model. If the flask is not quite closed, then the bite will be lengthened or disarranged. But by locking together the base-part B and center C, Fig. 3, the model A and waxed-up teeth B, Fig. 5, can be set in the deep flask so that the investing plaster D shall cover the top of the teeth and make the parting-line at the edge of the center-part C. Then the flask top T may be locked onto the center C, Fig. 5, and plaster poured through the half-round center on to the shellacked and oiled parting surface to form the mold-part E. This subsequently serves as a plunger to drive the rubber R, R, into every crevice around the teeth. The grooves for the surplus S, S, should be deeper and nearer the teeth than shown in the sectional view, Fig. 5.

In packing the rubber there is opportunity for both judgment and skill in cutting suitable pieces, keeping these and the flask-parts warm and clean, and packing the pieces in close contact without much excess of material. The surplus groove should, however, be ample to allow the complete closure of the flask after immersion in very hot water, followed by strong screw-pressure. The closed flask should be securely locked to retain the valuable compressive action for making the vulcanite base dense.

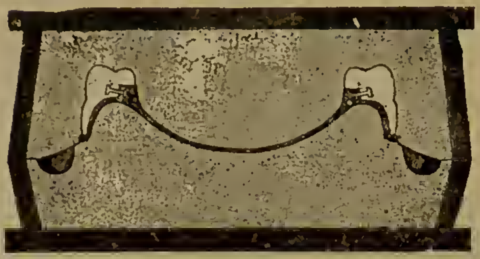


Fig. 4.

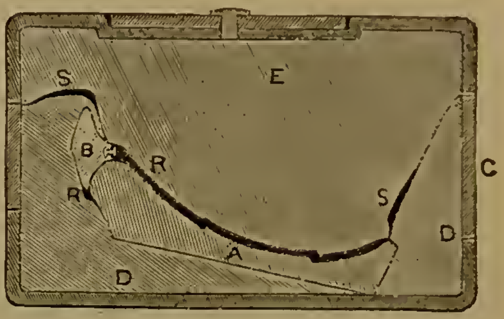


Fig. 5.

A rubber of well known purity, strength, color, and vulcanizing heat period is always to be used, but it is a very important fact that the proper heat and time limits are to be varied in accordance with the differing thickness of the several portions of the case in hand; the best results being generally attained by a gradually raised and finally sustained low and long heat. For instance, with a rubber scheduled for one hour at 320° F., a large denture having thin palatal with thick ridge and lip portions will properly require a gradually rising preliminary heat of full forty minutes, and a final period of an hour and a half at 310° F. The surprising excellence of the hard and tough product will well repay the extra expenditure of time and care.

If found necessary (as it seldom should be) to do considerable filing and scraping in finishing such a denture, no holes and stretch-traps will be found in that vulcanite, because intelligent provision has been made for the slow and certain interstitial evolution and elimination of the sulfuretted hydrogen which is often confined within the vulcanite skin to form the foul pores and pockets resulting from the commonly crude and quick process.

A first-class automatically regulated vulcanizer is preferable, and the best can be none too good considering the professional work to be done. In any case the vulcanizer should be steam-tight, then water a quarter of an inch deep will be sufficient, and will not boil into the flask to soften the plaster and otherwise cause injury to the vulcanite.

FLASK-HOLDER FOR WASHING OUT WAX.

Items of Interest, February.

A tin dipper with bottom perforated, says Dr. W. P. Brown, of Germantown, Pa., makes an excellent holder for flasks while heating in water and washing out wax.

FLASK LIFTER.

For handling the flask in hot water, an inexpensive and effective lifter can be made of an iron kitchen flesh-fork. Bend the handle almost straight up, when the fork is resting on the table. The flask can be set on the lifter and all set in the water, removed and carried to the press.

FLASK PARTING OIL.

Dr. W. S. Elliott, Sag Harbor, N. Y., says the best material for parting flasks is the oil used in the Edison battery.

FESTOONED GUMS.

DR. M. L. FAY, BUFFALO, N. Y.

Dental Digest, December.

An easy and yet effective mode of making a carved or festooned gum on an artificial denture, without the tedious carving by hand, which involves considerable time and patience, is as follows:

Arrange the teeth and wax up the case as desired, but leave the necks a little exposed, and with a closely-woven cotton string, which has been drawn through melted wax and allowed to cool, festoon the necks of the teeth, pressing the string between them with any instrument suitable for the purpose. Then with a warm spatula unite the string to the wax and smooth up the case with a mouth blow-pipe, which will draw the wax up on the string and give pleasing results. Invest and pack the case, removing the string with the wax.

When ready to finish, trim up with a sharp instrument the thin margins of rubber overlapping the teeth and polish with pumice and a stiff brush-wheel. This will reduce the prominence of the festoon and make it very lifelike. Do not polish the pink rubber with the fine wheel, as the effect is much better when left dull.

TAKING LOWER IMPRESSION.

DR. J. F. FRIBLEY, DECATUR, ILL.

Dental Digest, August.

Where the ridge is hardly perceptible, and the muscular attachments are so near together on the top of the ridge there is hardly a line of space where the plate could rest undisturbed by the action of the muscles in movements of the jaw and in mastication. In such cases exercise care in taking the impression, having the plaster not too thick, and just as soon as the cup can be inverted without the plaster dropping out put it in place in the mouth, requesting the patient to move the jaw as in the process of mastication, and being careful to hold the cup firmly when once in place and to follow each movement.

This is kept up until the plaster is of a putty-like consistency. Then, of course, the jaw can come to rest, as there can be nothing gained by keeping up the movement.

After removing the impression from the mouth in time there are to be seen small grooves, depressions and elevations, which correspond exactly to the muscles, depressions and elevations of the ridge of the jaw, and when the plate is made it will fit perfectly and not be displaced during the process of mastication or in other movements of the jaw. In partial lowers use the same precaution in taking the impression as in full cases where the same conditions exist.

IMPRESSION OF SOFT MOUTHS.

Dr. Chupein says impression of soft mouths, or mouths having soft and hard places, should not be taken with plaster.

PARTIAL IMPRESSIONS.

DR. THEO. F. CHUPEIN, PHILADELPHIA.

Dental Office and Laboratory, May.

Take a piece of brass or German silver plate and fit pieces between the teeth where the plaster is likely to fracture. Make these pieces about one-eighth of an inch higher than the cutting edges of the teeth in the mouth. Next wipe the teeth dry with bibulous paper, and when dried apply to the dried teeth some adhesive wax made almost fluid with heat. This adheres firmly to the teeth, and by warming the pieces of metal previously fitted, they are held firmly in the interspaces. The mouth being thus manipulated, the batter of plaster is prepared and placed in the impression cup, and carried to the mouth, where it is steadily held until the plaster hardens. Should it fracture in the effort to remove it from the mouth, the fracture will be of such a nature that the parts may be easily and accurately replaced in the impression cup; for, as the pieces of metal were made only a trifle higher than the cutting edges of the teeth, these being the weakest points of the plaster impression, the lines of fracture will be in these localities and therefore will not, in the least, interfere with the perfection or integrity of the impression.

PARTIAL IMPRESSIONS, IN COMPOUND.

DR. C. C. M'CLOUD.

Take the impression in the usual way and have a pan of hot water near; after taking impression from the mouth dip in the pan of hot water so as to soften the surface, place it back in the mouth and where the impression was faulty at first, the second time it fully adapts itself to all portions of the teeth and ridge and palate.

TO TAKE FULL UPPER AND LOWER PLASTER IMPRESSIONS.

DR. CHAS. BOXTON, SAN FRANCISCO.

Stomatological Gazette, November.

In taking an impression the less directions given to the patient the easier it is for the operator. Select a tray the proper size and shape, place the plaster around its floor, making it thin on the palate, unless it is a very high arch, high all around the outer flange of the tray. The operator stands to the right and rear of the patient; the mouth should be opened just wide enough to admit the tray and contents, so as to allow of its greatest lateral distension. This is especially necessary when the mouth is small and the jaw relatively wide. The right side of the mouth is pressed away with the corner of the tray, the left side is distended with one or two fingers of the left hand. When the tray is in its proper position the back edge is forced up in place with the forefinger of each hand; the pressure is gradually brought forward, and, when in position, the lip is drawn down, thus forcing the plaster well up under the lip. Everything being in place, request the patient to lean forward. While the plaster is setting the tray must be held perfectly steady.

In taking a full lowerimpression, proceed as for a full upper, with the exception that the operator stands on the right and front of the patient, and the left side of the mouth is pressed away with the corner of the tray. The right side is distended with one or two fingers of the left hand. Request the patient to raise tongue as soon as tray is placed in mouth; after pressing tray down run finger along outer side, forcing the cheek out and plaster down; have patient lower tongue to force plaster close to ridge: have patient lean forward, and hold firmly in place until plaster is hard.

TAKING IMPRESSION BEFORE EXTRACTING.

On account of disease it sometimes becomes necessary to extract teeth and replace them with artificial ones. Before extracting, take an impression in modeling compound, and as each tooth is extracted place it in its position in the impression; pour the impression, which will form a model containing the natural teeth in their original positions. This model is a guide in selecting and arranging the substitutes.

MODELS OF NORMAL NATURAL TEETH.

To accomplish the best results in the construction of artificial dentures, it is essential that impression and models be made of many full natural dentures, and that these models be studied in every detail. A dozen well made articulated models are not too many to have.

TIN COATING FOR PLASTER MODELS.

CHARLES P. ALKER.

Dental Office and Laboratory, September.

Reduce ordinary collodion with about three times its bulk of ether and add powdered tin till the solution is well impregnated with the metal. Applied with a brush, an even coating of tin is formed on the model, so dense as to closely resemble tin-foil, and so firm as not to be detached by boiling water.

A plate vulcanized on a model thus prepared is as readily cleansed with a coarse brush as though made in a metallic mold.

SULPHUR MODEL.

Brit:sh Journal Dental Science, December.

Mr. C. B. Thomas, at a society meeting, exhibited a gold plate burnished on a sulphur model, and strengthened. The sulphur is melted and run into the impression.

TO DUPLICATE MODELS.

Zahntechnische Reform, November.

Lime, 10 parts; fine sugar, 10 parts; and glycerin, 12 parts. Mix this thoroughly, heat, and press the original model into the compound, and after the latter has been completely hardened, deliver the model. Perfect duplicates can be made in the mold thus obtained.

TO STICK RUBBER TO THE MODEL.

Dip the rubber in chloroform just before packing, and it will adhere to the model.

TO MIX PLASTER.

Sprinkle the plaster in the water until it rises to the surface, allow it to stand a little while, then stir a few times.

TO USE GUM ACACIA WITH PLASTER.

Journal British Dental Association.

The addition of gum acacia to plaster, when used either for casting models or taking impressions, is advocated by Mr. E. Lloyd Williams. When the plaster is used for the purpose of obtaining an impression, he adds one ounce of mucilage acacia to a pint of alum solution; when, however, the plaster is used for casting models, slightly less is required. The addition of the gum acacia is said to render the plaster less pliable and more dense, and gives it at the same time a silky look.

IMPRINTED ALUMINUM PLATE.

The Bur, June.

The aluminum plate, as manipulated by Dr. Sitherwood, is covered on one side by rice cloth and passed through the rolling-mill. This forms the imprint of the cloth and aids it in adhering when made into a denture.

SWAGING ALUMINUM PLATES.

Southern Dental Journal, April.

Place a piece of paraffin paper between the die and the aluminum; over the aluminum place thin rubber dam and mallet in proximate form. Remove the rubber dam, and place paraffin paper between the aluminum and the counter die. Prevents both leading and battering.

TINNED WAX BASE PLATE.

DR. T. H. PARRAMORE, HAMPTON, VA.

Written for The Compendium.

It is better to line the wax with tin-foil than to lay the foil on the model, and work the wax down on it. Warm the wax sheet, lay a sheet of No. 4 tin-foil on it and press smoothly down; then warm the tinned wax, and press it on the model with tin down.

TO PREVENT LOWER BASE PLATE BENDING.

Imbed in the wax a semi-circle of wire. A hairpin bent to the proper shape is excellent.

GUTTA-PERCHA FOR BASE PLATES.

DR. H. L. CRUTTENDEN, NORTHFIELD, MINN.

Written for The Compendium.

It is better to have some old gutta-percha, if possible, as the mass, when mixed, will work better. If the old cannot be had, the new mass will not work very satisfactorily at first, but will continue to improve. The material can be obtained from rubber manufacturers. Place the old and new gutta-percha in hot water until soft; remove and knead thoroughly. To pull it like candy until it is thoroughly mixed is a good way. Soften in warm water and roll to the desired thickness with a glass or porcelain rolling pin or bottle.

The writer claims superiority for this home-made article, and says if it is once used, wax will be discarded for base-plates.

PLATE MAKING, SOME PRACTICAL SUGGESTIONS ON.

DR. L. P. HASKELL, CHICAGO.

Stomatological Gazette, February.

Babbitt metal is the only alloy suitable for dental dies. It does not shrink, is sufficiently hard not to batter, sufficiently tough not to break, and makes a smooth die. Nothing has so simplified the fitting of plates as the use of this metal. The proper formula is: one part copper, two parts antimony, eight parts tin. As pure lead can not be poured upon this without danger of adhering, the melting temperature is reduced by the addition of tin: five parts lead, one part tin.

In the preparation of the model for the die one thing is largely overlooked, viz: that the center of the palate is hard, and the only portion of the upper jaw that never changes, while the alveolar ridge gives way from absorption caused by undue pressure, and more especially from the retention of undue heat of rubber plates. Unless provision is made for it, the plate sooner or later rests and rocks over the hard center. This is remedied by a relief, a film of wax with the edges chamfered thin. No air-chambers are needed in full upper plates; in many cases they are positively detrimental to a successful use of the plate.

Since the introduction of a pure aluminum there is no reason why a patient should wear rubber for permanent work. It makes a rigid plate, and he has never been able to discover that it is affected by the secretions. In attaching the rubber the use of the loop-punch removes the difficulty of securing close adhesion of rubber to the plate. In thickness it should range from gauge 24 to 22. In swaging aluminum, if there are deep undercuts, cut away the portion of counter-die which fills the undercut, as otherwise the plate may tear; then, when swaging is finished, burnish or hammer the plate into the undercut. For annealing, hold the plate over a Bunsen burner till a match chars over it.

In case of heavy undercut make a core of plaster and asbestos, as it has a fiber to hold together. Dry thoroughly, mold and replace core in the mold and cast.

In swaging, oil the dies to prevent, as far as possible, the base metal from adhering to the plate, and before annealing again wipe off all traces of the metal. It saves much time if the margin of the plate in front be cut to the surface of the ridge lapped, and after swaging, soldered, thereby giving additional strength to the weakest part. Of course, aluminum plates must be swaged without cutting.

Too much attention cannot be given to the correct articulation of dentures. More failures result from faulty articulation than from any other cause. None of the six anterior teeth should meet; the pressure should be upon the bicuspids and first molars; exact pressure on both sides. If there be a second or third molar that has assumed an angle of 45 degrees, or thereabouts, the upper molar should not meet its face, for thereby the plate is crowded forward.

It is in the insertion of lower dentures where the dentist has more trouble than in any other class of work. As there is rarely ever any suction, and in the majority of cases but little ridge—the muscles and glands under the tongue so often rising high above the ridge, even if not attached near the margin of the ridge—it necessitates a narrow plate, for so long as the plate is lifted by the muscles it is impossible to keep it in place. For these reasons, if there is even one sound, solid tooth, retain it for anchorage. And, as there is so much more tendency to change in the lower than in the upper alveolus, if several good roots were left distributed over the jaw it would be of great benefit to the patient.

In the preparation of the upper jaw it is not advisable to retain roots if most of the teeth are missing; would neither advise the retention of the cuspid teeth if all others are extracted; a far more satisfactory denture can be made without them, and they are of no possible use. As to the claim that with extraction the contour of the mouth can not be restored, it is a great mistake. By making the plate higher (and it can always be worn higher) over the cuspids than elsewhere, and the gum fuller, this lost expression can be restored.

In partial cases, where the teeth are all gone on one side, and even the anterior, clasp to one of the remaining teeth (bicuspid if possible); and, if necessary, extract one and put an artificial tooth there, to secure a balance in mastication.

The proper arrangement of teeth seems to be largely misunderstood by dentists. There are certain rules applicable in all cases, and beyond that the dentist's judgment and experience must be relied on.

Dr. Bonwill, some thirty years ago, made an exhaustive study of the subject of the principles involved in nature's arrangement of the teeth, and discovered certain great underlying principles, showing how nature applies geometrical laws in proportioning the different classes of teeth—centrals, laterals, cuspids, bicuspids and molars. He will tell you upon the examination of any tooth in the upper jaw what is the width of each other class of teeth in that jaw. He ascertained that the six anterior teeth form the arc of a circle, the radius of which is determined by the combined width of the central, lateral and cuspid teeth. A circle of brass, or other metal, of which this is the radius, if applied to the cutting edges of the incisors leaves the cusp of the cuspids a trifle outside, and the first bicuspids right on the margin, same as incisors, leaving about one third of the second bicuspid outside the circle, and including the anterior lingual corner of the first molar. A line drawn through the center of this circle will always pass through the center of the second bicuspid, and a line across the posterior periphery of the circle passes across the posterior margin of the second molar, thus showing the relation of the different classes of teeth to each other as regards width. This is easily demonstrated by applying it to the natural teeth when they are not displaced. This rule is of great aid in the arrangement of artificial teeth.

Dr. Bonwill also discovered that the lower jaw forms an equilateral triangle, varying not more than 1-4 inch from four inches from top to top of condyle, and four inches from condyle to median line of alveolus. There is no doubt that his method of arranging teeth by the use of his articulator is the correct one, if artificial teeth were made like nature's in all respects. Unfortunately the combinations of teeth—the posterior to the anterior—are usually much out of the way. Often large anterior have small posterior, and vice versa. Then again, as a rule, bicuspids and molars have generally too small masticating surface. While the lingual cusp of the upper should always be shorter than the buccal, they are usually made as long. A very serious fault with bicuspids and molars (in rubber teeth) is placing the pins so near the crown as to leave but little cusp above it, so that in articulating it is often ground off, or nearly so; not only this, but it brings the artificial gum too near the crown. This is often the case in the longest of teeth, when it is totally unnecessary. Justi's teeth are freer from these faults than any that are made.

In arranging an upper set to lower natural teeth, it must be remembered that whatever the position of the lower anterior teeth the uppers must be arranged symmetrically, as they give expression to the mouth more than the lower ones.

In arranging a lower set, begin with the bicuspids, so as to insure correct articulation; then, if necessary, crowd or lap the anterior teeth.

Avoid too close closure of the jaws, as it not only gives a bad expression to the mouth but renders it more difficult for the patient to use them. However, in old people the jaw is thrown forward by shortening of the ramus, and the lower teeth had better not be made as long as they should otherwise be.

Patients should be taught the necessity of wearing partial lowers when all the posterior teeth are missing; not only for masticating purposes, but to keep the upper set in place more satisfactorily.

In partial upper cases gold makes more satisfactory work than rubber, especially in cases of the anterior teeth, when the lower teeth close near the gums and are prominent. In such cases plate gum teeth are needed, as they are so much thinner than the rubber gum teeth. There is no objection to properly adjusted clasps. These should be soldered to the plate only for a short distance, so as to give the clasp free movement.

Select plate teeth with straight or perpendicular pins, as the teeth are stronger and less liable to break in soldering and in wear than the cross-pins. There is no difficulty in soldering if all the conditions are right. Close up any spaces under the backings, which should be of thicker gold than the plate, gauge 24. Do not rivet the pins, but split, and then the solder will flow down the sides of the pins. Apply the borax and solder, cut in small pieces. Heat up over large burner, hot as possible, and with the blowpipe apply the heat at first to the center of the plate, as the backings are so exposed they heat first, and the tendency of the solder is to flow when it is hottest. A large-flame gas-soldering burner in a horizontal position will be found better. The mouth blowpipes sold at the dental depots are simply jewelers', who use low carat solders, and have no investment to contend with. The dentist needs a much larger one, the mouthpiece of which is pressed against the lips so the muscles are not fatigued, and he can blow a larger blast. The dental supply companies now furnish such a one, made at my suggestion.

FUSIBLE METAL FOR LOADING LOWER PLATES.

DR. W. H. RICHARDS, KNOXVILLE, TENN.

Dental Cosmos, May.

Lower rubber plates are loaded with low fusible metal, either for the purpose of making a new plate, for a much absorbed gum, stable by additional weight, or for restoring an old plate to comfortable service cheaply, or for prolonging the use of a temporary plate under which absorption has gone on rapidly, but not so completely as to demand replacement with a new one.

The new plate, after being finished in the usual manner, is oiled on the gum side, and is pressed into soft plaster which has been poured into a tin rim until the plaster covers all the surface of plate intended for contact with gum. After the plaster is set, raise tin rim, until within one eighth of an inch of its lower edge, then oil all the plaster surface within the rim ; pour in plaster sufficient to fill the rim and cover the teeth ; separate as soon as hard ; cut a dovetailed groove in the center of plate over the ridge, in depth according to the amount of weight desired; also a gate from heels of plate to rim; place the parts together accurately, hold them in boiling water until the metal is melted, then pour, cool, and finish.

To restore an old plate or prolong the life of a temporary one, the same general instruction will apply, except a roll of wax, well softened, is placed into the groove occupied by the ridge. Place in mouth and require patient to close the mouth until proper articulation is obtained. Remove, trim wax, and pour up plaster as before directed; wash out wax and cast metal, which will require some undercuts to retain.

TO ARTICULATE UPPER PLATE WITH LOWER FRONT TEETH.

Western Dental Journal.

It is often very difficult to make a full upper denture work satisfactorily when the patient has only the four or six lower anterior teeth. If only the upper set is to be supplied, in adapting the teeth to conform to the lower teeth, leave room for the lower teeth to pass inside of them without touching, thus preventing tipping at the back. Have the lower teeth bite upon a shoulder of rubber upon the upper plate, from the pins of the teeth back about one eighth of an inch. When the vulcanite is thus used for a masticating surface use only the finest rubbers.

THE APPLICATION OF THE PRINCIPLE OF CROWN-WORK TO METAL PLATES.

DR. JOSEPH HEAD, PHILADELPHIA.

International Dental Journal, October.

The writer says the great difficuty in making gold dentures, when the teeth are ground to the plate, lies in the impossibility of grinding the teeth with sufficient accuracy to prevent an influx of food that will in time become foul. Although rubber attachments have to a certain extent lessened this objection to artificial dentures, still, when red rubber is used, its shrinkage from the porcelain and metal will invariably allow some small recess for leakage. And while pink rubber obviates the leakage to a great extent, the deterioration that invariably attends its prolonged presence in the mouth is a serious drawback.

He and his brother have been experimenting in this line for some years, and while their results are neither startlingly valuable nor original, still it would seem that they have solved the problem of making the porcelain lie absolutely against the gold of the plate. The ordinary process is to strike up the plate, grind the teeth as closely to it as possible, back them, and solder the backing to the plate.

The variation from this would seem, now that it is done, comparatively simple. Instead of grinding the tooth to fit the articulation, it is ground accurately to the plate so as to be a trifle short. It is then backed up with a piece of thirty-two to thirty-four gauge annealed gold, which extends all the way between the plate and the porcelain to the cervical margin of the tooth. In burnishing this thin gold into the inequalities of the porcelain, the metal becomes springy and refuses to hug close to the tooth. When the backing has been trimmed to the size desired, it must be taken off and bent to an angle less than the angle made by the bottom and the side of the tooth, and when it is slipped in position again the gold and porcelain will lie snugly together everywhere. Over this thin backing a thicker piece of plate is placed that covers the entire inside of the tooth, but does not extend between the plate and the porcelain, when the re-enforced backing can be secured by bending, splitting, or riveting the pins, as the mechanic may see fit.

In preparing the case for investing, the tooth should be so cemented to the plate that all cement can be easily removed with a fine instrument after the investment has become hard ; and all around the cervical margin where the tooth-backing touches the plate, a fine paste of borax should be placed to prevent the soft investment from marring the perfect filling in of the solder. Great care must also be taken that the plate and backing be well cleansed and borax used before the tooth is cemented in position. The investment of plaster and sand, or plaster and marble-dust, as may be desired, must be flowed over the tooth and around the plate with all the care one would exercise in investing a rubber denture; for if spaces are left where the solder can pinch the porcelain, chipping will infallibly occur.

When the investment is hard, pick away the cement, place the solder in position, and heat up from underneath until the solder starts of itself to flow, when, with the aid of gravity and the pointed flame, the solder will run down underneath the tooth and fill all the spaces solidly.

Where a tooth stands alone on the plate, the well-known principles of crown-work are to be followed in their severe simplicity ; but when three or four teeth are to stand together side by side, the following precautions are imperative :

Each tooth must be so isolated by investment as to make it impossible for the solder to flow from one to the other, and spaces must be left between the teeth so that the contraction of the plate on cooling will not crush them against each other. Sometimes it has been found advisable to slip small pieces of mica in between the necks of the teeth, but it must not extend up high enough to jamb in between the porcelain. Where the teeth would naturally touch small pieces of paper should be placed, which, burning out under the flame, give a space that, while it is ample for safety, is quite imperceptible in the mouth.

When a single tooth is to be surrounded by solder, just as a rubber tooth is by rubber, all angles should be ground off the tooth where the solder could possibly cause the backing to pinch the porcelain ; the backing should be cupped and invested around the tooth everywhere the solder is expected to flow; then, prior to splitting the pins, the backing is partially taken off and thin paper placed all around the edges between the metal and the porcelain. It is then slipped back into position and secured.

The tooth is then waxed to the case in the same way that one would wax a rubber case, care being taken not to flow the wax beyond the metal over the tooth.

This is then invested in the ordinary way, the wax boiled out, milk of borax wiped in with a brush, and the case is ready for filling in with solder, which is readily and safely accomplished if the heat is properly applied.

PLATE WITH LOWER MOLARS ONLY.

DR. J. F. FRIBLEY.

Dental Digest, August.

It consists of a plate with a clasp on the buccal surface only, and a swaged aluminum band vulcanized into the rubber which attach the posterior teeth. After taking an impression fill with metal, being careful to get an exact copy of the lingual surfaces of the remaining anterior teeth and the gums and gum margins. Then make a counter-die and swage an aluminum band to fit the lingual surfaces, having points of aluminum fitting into the interproximal spaces—this is of the utmost importance. The ends of the band should extend far enough back into the rubber on either side to give a firm attachment.

Fit a band of clasp metal to the buccal surface of the teeth, proximating the denture on either side, and having the inside end of the clasp to fit and extend around the distal surface of the tooth till it touches the aluminum band and fits up to it.

The aluminum band or strip which fits the lingual surfaces of the teeth intact should be tempered to make it springy, and when the plate is pushed to place the points of the band drop into the interproximal spaces, and, with the clasps on the outside of the teeth next to the artificial denture, it makes a very comfortable and well-adapted plate.

TO LIFT RUBBER PLATE FROM PALATE.

Odontographic Journal, January.

To lift the palate of a rubber plate from the roof of the mouth in which it happens to rock when new, as well as after repairs, fill in the palatal side with plaster and later thoroughly warm the plate on the palatal side over a flame. The plate may be seen to draw from the model.

TO REMOVE PLASTER FROM VULCANITE PLATES.

DR. W. S. NOWELL.

If the flasks have been left in the vulcanizer over night, some difficulty may occur in thoroughly removing all the plaster. This is overcome by immersing the plates for five minutes in hydrochloric acid.

TO LINE RUBBER PLATES WITH ALUMINUM.

Dominion Dental Journal.

To line rubber plates with aluminum, roll the aluminum to twenty-eight gauge, anneal the metal with a blowpipe until it becomes white like unburnished silver. Thoroughly dry the cast, then with the two thumbs press the aluminum on the cast and burnish it to place, commencing in the center and working toward the edge. Prepare for adhesion of the rubber; use a chisel and carve the plate, making small hooks about one thirty-second of an inch long, in rows; then reverse the rows, turning the hooks in opposite directions until the surface of the plate is covered; anneal again and adjust the cast; wax teeth in place as usual and pack. The pressure under the press will make a perfect adaptation of the aluminum to the cast.

TO REPAIR BROKEN RUBBER PLATES.

DR. C. H. WEST, FARINA, ILL.

Dental Digest, May.

If it be a lower plate, fill a lower impression cup with softened modeling compound and, after placing the broken parts perfectly together, carefully embed the teeth downward in it. With a large engine bur cut out the crack from the inside, or maxillary side of the plate, to the teeth, and nearly to the lingual and labial surfaces. Then with a hot spatula spread new rubber over the fresh surfaces, which will adhere to them, and the space can be thoroughly packed a little more than even with the surrounding surfaces. Now carefully run model in the plate and over the freshly packed rubber, separate the compound from teeth, bur out, pack the lingual and labial surfaces the same way, and it is all ready to flask and vulcanize, without having to open, and all of the break has been burred out and filled with fresh rubber. After vulcanizing, the surplus rubber in the maxillary groove can be cut out even with the surrounding surfaces.

Upper plates are treated on the same principle—burring out, packing the maxillary and labial surfaces before running the model, after which bur the lingual surfaces to a feather edge posteriorly from the teeth, pack rubber with a hot spatula, flask and vulcanize. This plan saves opening flasks, washing out wax, etc., and the expansion of the soft rubber during the process of vulcanizing fills every open space and makes a very satisfactory job with a very little trouble.

To replace a broken tooth or a block of teeth, cut out from the lingual surface with a file or large bur, under where the broken piece was, until the pins of the new tooth or block do not strike the plate. Fit the new piece to place, wax it up, and flask and vulcanize as above described.

VULCANITE PLATES WITH SOFT RUBBER EDGES.

DR. W. V. B. AMES, CHICAGO.

Dental Review, July.

Pack flasks in the usual way with ordinary vulcanizable rubber, using draughtsman's tracing-cloth between the halves of the flask to permit separation. When the mold is accurately filled with the ordinary rubber, as much of this is trimmed away with scissors as it is desired to replace with the flexible plate rubber; this is packed and pressed into place and the case vulcanized. For upper plates the edge in the palatal region can be just back of the rugæ, leaving the palate uncovered. The flexible edge on uppers needs to extend only from a point back of the buccinator muscle on one side across the palatal region to the same point on the opposite side. For lower dentures the flexible edge must constitute the entire periphery of the plate. The model should be trimmed according to the best judgment of the operator, where flexible rubber is attached.

CARBORUNDUM CONES FOR FINISHING RUBBER PLATES.

DR. H. B. BARTLETT, OWENSBORO, KY.

Items of Interest, April.

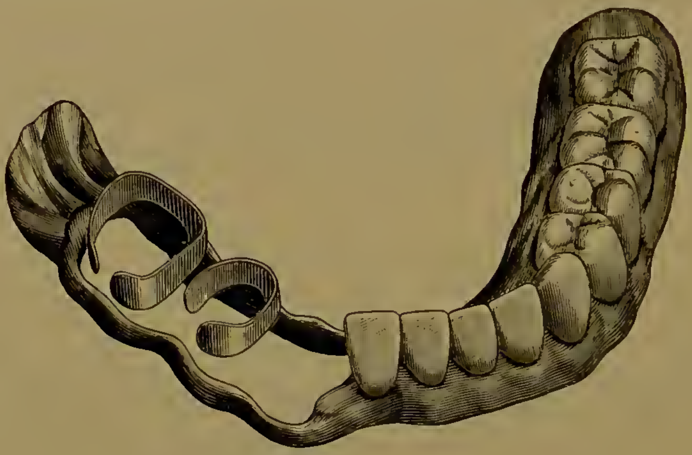
Turn some different sized wheels and cones of wood or cork, coat them with thick shellac, dip in the carborundum powder, and when thoroughly dry they are ready for use. In the place of sand-paper for finishing up vulcanite or celluloid work this is a quicker method, giving the same results in half the time. Then in polishing instruments it works wonders. For this use the felt wheels on lathe with the powder and pumice, half and half. Carborundum is certainly a useful auxiliary.

AUXILIARY PLATE SUPPORT.

DR. H. H. BURCHARD, PHILADELPHIA.

Dental Cosmos, August.

The illustration represents a device suggested by Professor C. J. Essig's method of preventing the slipping backward of partial lower plates. As shown in the cut, but three teeth remained in the lower jaw. The superior arch contained natural teeth on the side from which they were missing in the lower jaw. The stress of mastication would therefore tend to displace laterally any artificial denture that might be inserted. Clasping a bicuspid and molar, as was done in the case, would bring such a strain upon these teeth that they would become loosened. An additional support being indicated, the bar represented in the cut was applied.



A plate made of two laminæ of 18K. plate No. 30, or a single lamina of No. 24, is swaged to fit perfectly and to extend back on the alveolar ridge posterior to the molar; at this aspect, and at the part next to the cuspid, it is carried over the ridge, so as to offer points of attachment to the bar. Extending across that part of the plate which is beneath the natural teeth remaining, over the plate back of the molar and anteriorly along about a half-inch of the lingual border of the plate on the opposite side, a piece of platinum gold (clasp metal) No. 27, is soldered, being frequently annealed and swaged to perfect adaptation; broad clasps, No. 22, are fitted to the bicuspid and molar. The piece is now rigid enough to resist all stress. Along the buccal aspect of the arch and about a quarter of an inch below the cervices of the natural teeth, a piece of very broad, half-round gold wire was accurately fitted; resting lightly against the gums along its entire length, its extremities overlapping the points of plate about a quarter of an inch. The pieces were then cemented together, invested and soldered. The teeth were arranged; a series of cleats soldered in proper position, the teeth attached by means of vulcanite.

There is a matter which suggests itself relative to clasps. A clasp should be broad enough to grasp (when not in view) all of the enamel surface of a crown. Narrow clasps have a tendency to wear the teeth.

In the majority of cases where these appliances appear to abrade the teeth, the true cause is the fermentation of food debris which insinuates between clasp and crown; the loss of substance being due to chemical causes, not to mechanical. Very, very rarely does a properly fitted and properly finished clasp cause loss of enamel through mechanical abrasion. Usually when teeth are worn by the presence of clasps, the cementum has been embraced, not the enamel alone.

Keep clasps from close contact with any dental tissue but smooth enamel; make them broad enough, and at least nine out of ten cases of loss of tooth-substance will be found due to chemical solution, not present if proper precautions as to cleanliness are taken by the patient; the remaining case might be due to mechanical abrasion.

A LIGHT, THIN PLATE.

DR. W. H. TODD, COLUMBUS, OHIO.

Ohio Dental Journal, November.

After having carved and prepared the plaster model as the mouth would indicate, it should be painted with a thick shellac varnish, and covered, where the plate is wanted, with Japanese lead (lead-foil that comes in chests of tea). Be sure to have the foil burnished on the model, so that every inequality is shown. Get the articulation as usual. If it is desired to try in, take a piece of hard base-plate and cut it short of the alveolar ridge so that when the teeth are set up it can be cut out, leaving the teeth standing. Mount the teeth and try in; if all right, cut out the hard base-plate as close to the pins of the teeth as possible, replacing the base-plate with a plate of Japanese lead, using two or three pieces according to thickness of plate required, smoothing up next to the teeth, also the rim, with wax, just as the plate is wanted when finished, then take another piece of Japanese lead and cover the entire palatine portion and rim of plate to the teeth, always burnishing each piece down close.

The last piece cover with shellac varnish so that it will adhere to the other part of the flask, then flask up. Warm before separating; take out the middle pieces of foil and wash out with hot water. Use a piece of chamois skin and a little mercury and proceed to polish the foil in both halves of the flask until it is as bright and smooth as glass, then pack, using the toughest rubber.

When the plate is taken out there will be nothing to do but trim the edges and brush on the lathe, the result being the lightest, toughest and thinnest plate made.

WEIGHTING PLATE.

Dental Digest, May.

A writer says he weighted a lower vulcanite plate successfully by boring many holes in the inside of the plate, and filling them with amalgam.

VULCANIZING RUBBER.

DR. C. A. ALLEN, BUFFALO, N. Y.

Dental Cosmos, September.

The writer makes some good suggestions about the way to treat rubber. He says the gum being a hydro-carbon ($H_{16}C_7$) is mixed with sulphate of mercury in the proportion of one to two of rubber, which, if treated properly, makes a uniformly dense plate material. The disadvantage of high heat is shown by the melting point of sulphur, it being 237° F. And according to Dr. Southwick, the melting point of rubber is 240° F. The writer says:

With the component parts of the body all fused, we may naturally expect the commencement of that remarkable and little understood physical change in the compound which we term vulcanization. That this change does begin at once upon the fusion of the compound's ingredients, and that vulcanization, as we understand it, may be fully completed without the addition of a single increment of heat, is easily demonstrated. All that possibly could be required, in addition to the present conditions, would be a continuation of the 248° to 250° F. over a longer period of time. If doubt exists in the mind of any one as to the truth of this statement, let him obtain a lazy man's proof of it by asking any manufacturer of rubber garments how he treats the articles as to temperature, time, etc.

Continuing his quotations of the authority mentioned, he fearlessly makes the statement that the actual destruction of vulcanite begins at 300° F., and continues in proportion as the temperature is raised to 600° F., where rubber will be entirely dissipated, the sulphur being affected in the same manner at 824° F.

A word in regard to vulcanizers and their use. It should always be borne in mind that the degree of heat indicated by the mercury bath thermometer never registers the degree of heat corresponding to that of the inside of the vulcanizing pot where the case is being treated. The figures for this statement are as follows: If the stratum of atmosphere inclosed in the pot above the water line (when the cap is adjusted) is not expelled upon a degree ot heat sufficient to generate steam being reached, we can always confidently rely upon the thermometer registering from 15° to 18° F., according to the amount of water, below that actually existing within the chamber. Not only this, but we must always be prepared to take into account a considerable loss of registering power of the thermometer through the radiation of heat, the convection of air currents, temperature of room, etc. To these influences you can always safely charge a loss of registering power of the thermometer of at least 15° F., and usually more often 20° F. If these figures can stand verification, and he declares they can, what will be the result? Simply this: the man who does not expel the atmosphere from the pot really subjects his case to at least 30° F. of temperature more than that indicated by the thermometer. If he does expel the atmosphere he still has 15° F. more than that registered. From this point deductions are easy. We have declared that the destruction of vulcanite begins at 300° F. actual. As an illustration of this point, let us imagine a case being treated at the old-fashioned 320° F. without regarding these two influences. The result is easy. Instead of 320° F. we have at least 350° F. If the stratum of atmosphere is expelled we still have 335° F. to which the case is being subjected. If these figures and those preceding them are correct, we find ourselves treating vulcanite anywhere from 50° F. down to 35° F., above where the destruction of the compound actually begins. We are now asked what will be the manifestations of this unscientific treatment of the most abused and least understood body in the dental world. Every child in the land associates with rubber the property of elasticity, and that to the degree of exceeding in this respect any other body known to him. Do the high-temperature plates retain this characteristic? By no means, and, on the contrary, they have entirely lost it. Why? Because the extreme temperature to which they have been subjected has destroyed this natural inherent characteristic.

LIQUID SILEX AND ITS USE.

DR. H. H. BURCHARD, PHILADELPHIA.

Dental Cosmos, July.

The solution known by this name, or as soluble glass, chemically the sodium silicate (Na_2SiO_3), is quite as effective a medium to prevent the adhesion of plaster to vulcanite as is tin-foil, but certain precautions are necessary to procure the best results. The material should be kept in a moderately warm place, and tightly stoppered. As soon as its viscidity becomes greater than that of a thin syrup, throw it away and buy a new bottle. Should it lose its perfect clearness, discard it. The writer finds that about one-third of the four-ounce bottles in which it is sold is useful; the remainder is usually so deteriorated as to be worthless. Dilution with hot water and warming the solution restores its appearance, but for dental purposes not its virtues. The model, after investment, and also the teeth and entire investment, are freed of adherent wax by pouring over them a stream of boiling water. The excess of water is absorbed by means of bibulous paper. As soon as the wet appearance disappears from the plaster, it is ready to receive the silicate, not before.

A camel's-hair brush, having a fine point and no loose hairs, is dipped in the solution and the surplus wiped off the brush. The plaster surfaces, all of them, are painted lightly with the silex, carefully avoiding contact with the porcelain or platinum pins. By means of the fine point on the brush the matrix of the rim is painted between the teeth ; in coating the cap side of the investment, much care is required to prevent touching the teeth. Small wisps of bibulous paper are quickly and gently passed over the painted surfaces until there is but a thin glaze covering every part of the plaster. The pieces should be set aside for at least fifteen minutes, to permit thorough hardening of the silex. After vulcanizing the flasks should not remain unopened over night, for if salt (sodium chlorid) has been used to hasten the setting of the investment, the surface of the vulcanized plate will be covered by a hard and tenacious gloss ; if opened as soon as cold the plaster and silex part from the vulcanite, without even washing, leaving a smooth, glazed surface equal to that found under tin-foil. The mechanic may be certain that the lack of good results is due to either carelessness or faulty silex.

ESSENTIALS OF SOLDERING.

DR. H. J. GOSLEE, CHICAGO.

Dental Review, April.

The essential elements of soldering are : The thorough removal of all oxidation from the surfaces to be united ; contact or apposition of the parts ; the use of a flux upon the surfaces of both metal and solder, which permits the latter to flow readily, and of union between them, by preventing oxidation; and the heating up of the object to be soldered—whether it be in an investment or not—to or near the degree of heat required to fuse the solder, before any attempt is made to do so.

The definition of solder, as we understand it, is a combination of metals which fuse lower than the highest fusing component part; zinc being mostly used in the ordinary gold solders as the baser incorporate, by which the fusing point of the mass is reduced and regulated, imparting also increased properties of flowing. Consequently a twenty-carat solder, for instance, will fuse lower than plate of the same carat, otherwise it would not be a solder; and yet there are some who would not think of using a twenty-two-carat solder to unite plate of the same carat, while it may, of course, be done with perfect ease, and in cases which require two or three solderings to good advantage, as such would in that case facilitate matters by lessening the possibility of unsoldering parts already attached.

Perhaps paramount among the difficulties encountered in or connected with the soldering of plate or crown and bridge work is the apparent unavoidable fracturing of porcelain facings; and while it now seems probable that the coming work of this kind may, perhaps, be done without subjecting the porcelain to the heat of soldering, it is, at the same time, perhaps just as well to consider for a moment the cause of the frequent checkingof facings. There seems to be no imperative reason why it cannot be avoided in a limited percentage of cases; though we are aware at the same time that some men in this line do not hesitate to make the broad assertion that few facings are ever entirely devoid of checks after soldering, and contend that if the same at the time are not noticeable to the eye, they are conspicuously so when the facing is subjected to the lens, or that they materialize and appear in time.

It must be remembered that a porcelain facing in itself presents two substances, the porcelain or feldspar, and the platinum pins, each of which is affected entirely different by the great amount of heat necessary to solder; the former absorbing and retaining the heat for a considerable length of time, and the latter, while absorbing it readily, gives it off or cools with equal rapidity; consequently when a tooth, properly backed, is to be soldered, too much care cannot be exercised in cautiously and evenly distributing the heat from the beginning of its application, so that the porcelain which is usually farthest away and covered or protected by an investment material, receive it in equal proportion simultaneously with the metal; otherwise the metal receiving the bulk of the heat first rapidly through the medium of the platinum pins conducts it to the porcelain before the latter is correspondingly and sufficiently heated to avoid uneven expansion, and as a result, the characteristics of the substances considered, what would be more natural than the occurrence of a fracture in the more brittle and friable material, usually across the center of the facing, on a line with the pins.

Acknowledging this then to be one and perhaps the main cause, it is evident and conclusive that it can be avoided by so regulating the application of the heat that the investment, which is usually a poor conductor, receives the most of it, or entirely so, until the whole shall have reached a high degree, which, having come from the outside as it were, must have been equally and evenly distributed; and furthermore, as a precautionary means, the platinum pins should always be cut off as close as possible to the backing, only leaving enough remaining to retain same in its proper relation to the facing by splitting or riveting them; for if left standing out straight or bent over upon the backing, they must necessarily, by virtue of their prominence, receive the bulk of the heat from the blow pipe as soon as the flame is directed upon the backing.

Great care is also necessary in the preparation of a facing to receive its backing, and in the perfect adaptation of the backing to the same, that no overhanging edges of the metal be left upon the porcelain, as this will invariably result in a fracture or numerous small checks occurring along the edges of the facing so neglected and due to the impingement upon the porcelain, occasioned by the contraction of the solder upon the backing in cooling; and in this respect, and of equal importance of course, is the arrangement of the teeth in alignment, that sufficient space be left between them to allow for the taking place of this same physical change in the metal upon cooling; and it may also be well to add that after the soldering is completed the utmost care should be exercised in excluding any draught of air which may have a tendency to prevent the contraction of porcelain and metal taking place gradually and at the same time, and no attempt should of course be made to remove the case from the investment until this may have taken place and both are cool.

The extravagant and injudicious use of borax is another cause of numerous cracked facings, as it fuses lower than solder, and owing to the expansion of the average investment material it is thereby permitted to run out over the edges of the backing upon the surfaces of the porcelain, and usually or invariably results in fracturing the latter by giving off its heat and contracting much sooner.

The use of perhaps the most commonly used investment material, consisting of pumice stone in conjunction with plaster, presents, we believe, very objectionable features and of sufficient detriment, especially regarding its use in connection with porcelain facings as to cause it to be avoided; for, to begin with, it is a poor conductor of heat, expands very readily, and unless protected by a ferrule of metal, or by wiring tightly together, or by being much larger in bulk than either desirous or necessary, it invariably cracks open or falls apart, rendering liable the exposure of the heated facing to the air, which of course results in fracturing same; and again the pumice stone, like borax, fuses lower than the ordinary solders, and if in contact with, adheres to the surface of the teeth, and in cooling and contracting much sooner renders liable the presentation of the same undesired result.

Believing then, after careful consideration and numerous experiments, that in these we can safely concede the maximum number of probable causes of this particular bugbear, no hesitancy is experienced in maintaining that if the proper care, skill and judgment be exercised there is no necessity, and indeed very little excuse, for the fracturing of porcelain facings during the process of soldering, and consequently can see but little advantage or merit in the method hereinbefore referred to of simply soldering the backings and subsequently retaining the facings by means of cementing and riveting, and likewise feel no hesitancy in proclaiming it to be more of a fad than anything else, and certainly possessing more disadvantages than advantages; however, confining myself to the—let me say—conscientious expressions regarding the unnecessary cracking of facings in soldering; moreover to corroborate these assertions let us think why it is that so few facings are cracked in the construction of porcelain work where they are subjected to the heat of both the high and low fusing bodies. True they are occasionally fractured even then, but very seldom, and the ratio is certainly much less as compared with metal work.

Is it not because the porcelain and metal being enclosed in the muffle receive the heat at the same time, expand and contract under its influence together, that there is no overhanging edges of metal backings to impinge, and that there is no borax or low fusing investment materials to interfere?

And now a few words regarding the appearance of these cracks or fractures occurring or presenting themselves at some later period, as previously referred to and contended by some. It seems very evident to me that when they do occur, and it is only too often, that it is due, not to the fracture having been there since the tooth was subjected to the soldering, but more likely to negligent or poor adaptation of its backing, rendering in itself no protection whatever to the facing from the continued strain brought to bear upon it in the force of mastication; and it is safe to say that there are not one-fourth of the facings used, whether they be on plates or crowns or bridges, that are properly protected to withstand the ravages of this powerful force.

To see a facing badly checked or entirely broken off of a crown or bridge after same has been worn for some little time is by no means an uncommon occurrence with most of us, but to attribute this to the belief that it was due to the soldering, and has been present, though perhaps not visible since that time, seems hardly consistent, when, as a usual thing, all we have to do is to examine the broken facing and we will almost invariably see that that facing has had little or no protection along the cutting edge, and it is perhaps reasonable to infer that it lasted quite as long as could well be expected under the circumstances; for when we stop to consider the amount of force to which a facing is and must be subjected in masticating, and remember that it is retained by means of its attachment in a position both rigid and unyielding to the slightest extent, how can we overlook so important an essential as providing for the proper protection of them against any possible unnecessary strain, when the same can be accomplished with very little more work, and much more gratifying results.

Crown and bridge work would in the long run prove less laborious, and infinitely more successful and satisfactory to both dentist and patient if all were inclined to make an endeavor to remedy this evil, and regard this part of the operation as almost next in importance to the fit and adaptation of a crown to the root.

To accomplish this the facing should first be ground to assume its proper position and fit accurately, after which the lingual portion of the cutting edge should be so ground as to produce a sharp but smooth angle along the edge, the bevel extending to about one half the distance to the pins; then the lateral sides should be slightly ground to give a smooth marginal edge to which the backing may be finished nicely and without danger of overhanging edges. Use preferably pure gold from twenty-nine to thirty gauge, and after burnishing to fit nicely and leaving a small margin of surplus around the edges; it then should be removed and reënforced with plate or high carat solder to desired thickness. After it is sufficiently reënforced to insure strength, replaced upon tooth and riveted, the smooth marginal edges will enable it to be finished down to a fine line, leaving a joint when finished so close as to render it practically impervious, but in dressing it down along the cutting edge the file should be passed on a parallel line with face of the tooth, which, as can readily be seen, will leave the thickness of the metal covering and protecting this edge, and which can be left of a uniform and desired thickness to receive the force of mastication and relieve the porcelain of all strain.

Another great annoyance along the line of soldering, and of not uncommon occurrence is the tendency of solder to ball up—and which is invariably due to the endeavor to cause it to flow before the parts to be united are sufficiently heated, for as the affinity of one metal for another is increased by heat, it is imperative to first gradually raise the heat of the higher fusing metal to or near the degree at which the solder will fuse, and after accomplishing this, by applying the solder and then directing the flame upon both the surfaces of the parts and of the solder, having previously been fluxed with a thin paste of borax, no difficulty will be experienced in causing the solder to flow nicely with but a small pointed flame from the ordinary blowpipe, and without any exertion whatever; but if on the contrary the flame be directed upon the solder before the parts to be united are sufficiently heated, it will fuse within itself and boil up, and if much time be thus consumed the baser alloy or zinc will be burned out, requiring in consequence a greater degree of heat to cause it to flow than otherwise, and as the depletion of the zinc will to some extent increase the fusing point and decrease the flowing properties, the liability of fusing or burning the object to be soldered is also increased.

The parts should be fluxed before heating up, and it is always necessary to flux well the surface of the solder before attempting to control it, as containing zinc renders it so easily oxidizable it will not flow or cannot be managed unless it is properly fluxed, and in this respect it may be well to emphasize the fact that the borax should be mixed into a thin paste and applied with a small camel's-hair brush or similar means, as the quantity used can be governed better and its application be made only where it is needed, thus avoiding the common and by far too generous use of powdered borax, which, as has been previously stated, increases the danger of cracking the teeth, renders the solder more difficult to handle, and oftentimes causes the surface of the work to be freely covered with small pits.

For investing there are perhaps several substances which, in conjunction with plaster, possess all the desired qualities and advantages; however, we are inclined to use and give preference to the use of a material composed of ordinary fine white lake sand one third, and plaster two thirds, believing it to meet the requirements as well as any, and much better than some, for, being considerably coarser than many, it conducts the heat better, does not expand so readily, and, the sand fusing so much higher than pumice-stone, avoids the previously mentioned objectionable liability in connection with that substance.

The investment should be no larger in size or bulk than merely sufficient to cover and protect the teeth and retain the parts in position, and should be protected from expansion as much as possible by a narrow rim or ferrule of metal, or by being poured on to finely interlaced wire netting.

In instances where the parts to be soldered are not in contact one with the other, as frequently occurs, the space or spaces between may be filled in with foil-gold to good advantage, and thus bridged across, render the work of uniting them very simple; or with the use of a pointed steel instrument, the solder, when just beginning to fuse, can be pulled or coaxed over and across such spaces with ease.

In coaxing and in the controlling and management of solder, it is of much material assistance to see and note that gravity be favorable, for no matter how skillful one may become, it is of course somewhat difficult to cause a given mass to run up hill against its own weight; consequently in uniting a piece of two or more teeth, for instance, and especially if it be for the anterior part of the mouth where the curvature is greater, it is necessary to change the relative position as you progress, in order that the solder may run where it is required and remain when fused in the desired location.

Another not unusual occurrence of no little annoyance in the construction of a plate or crown is the appearance of one or more small holes in the metal during the process of annealing and swaging, and which is usually due to the presence of a baser metal upon the surface of the gold, usually tin or lead, which, fusing so much lower than the gold, becomes incorporated at its point of contact when same is being annealed, and results in the presence of a small hole. This baser metal is usually deposited upon the surface from contact with the dies during the progress of swaging, and the same, with its aggravating results, can, of course, be easily avoided by treating the metal to the acid bath after each swaging, being careful afterward, however, to thoroughly neutralize the acid by the free application of water before again attempting to heat or solder.

When the burning of such a hole does occur, or when one presents itself during the process of finishing, it can easily be obliterated with the use of a solder of same carat as gold by sweating over it a piece some little larger than the hole from the side, not interfering with the fit or adaptation. In so doing it should not be the attempt or desire to fuse the solder until it flows, but by first thoroughly cleaning and removing oxidation; investing, if necessary, to prevent unsoldering or for protection of porcelain; properly fluxing the surfaces of metal and solder; heating to a red heat and then simply wilting or sweating the solder down to its place by the use of a small pointed intermittent flame from the blowpipe only until it becomes firmly attached without flowing perceptibly, then ceasing; the desired result is accomplished with comparative ease and very little danger.

If no investment be used, or necessary, or even in cases where same is required, a precautionary means is frequently necessary to prevent the unsoldering of the parts; this can be very easily done by covering or coating such surfaces with either a solution of whiting or of plumbago, carbon or crocus (ferric hydrate), any of which will relieve all danger from that source.

So far as soldering is concerned the use of the bellows is rarely if ever indicated, and should in fact be avoided, for the amount of heat necessary, which is usually very much overestimated by the way, cannot be so well regulated, and more harm than good is liable to result in consequence; and, furthermore, a greater amount of heat than the combination mouth-governed blowpipe will give, if properly applied, is very seldom required, but to blow a continuous flame is a very valuable accomplishment for the dentist doing gold work, and can be learned by most any one devoting to it a little perseverance and application.

Some little thought and careful observation of our own work in this line will enable us to acquire a degree of proficiency that will render soldering a very simple matter.

ARRANGING TEETH.

DR. THEO. F. CHUPEIN, PHILADELPHIA.

Dental Office and Laboratory, September.

The case being articulated, the wax is cut away and one by one the teeth are put in place, each tooth being slightly heated to make it adhere to the wax.

The teeth should incline a little towards the mesial point. The teeth may be arranged regularly or irregularly, according as the features of the patient are pinched, or the arch small, indicating an arrangement of the natural teeth of the like nature.

The teeth being arranged on the upper plate, the six oral teeth and the four biscupids, when placed on a level surface, should all touch, except perhaps the lateral incisors, which are generally a trifle shorter. The first molar on each side should be a little shorter than the second bicuspid and the second molar shorter than the first molar, these two teeth rising almost imperceptibly, as the tuberosities of the jaw are approached. The cuspid should be a little in advance of the lateral incisors or slightly more prominent. The bicuspids should be hidden by the cuspids, and these teeth (the bicuspids) when it is possible should be more prominent at the necks than at their occluding surfaces, so that these teeth will incline inwards towards the tongue, rather than outward towards the cheeks. This position, it is true, may not be noticed in the natural arrangement of the teeth, but placed thus on the artificial plate there is less liability for the upper plate to be dislodged in the act of mastication.

In making an entire set the same rule holds for the arrangement of the bicuspids on the lower plate, only that the molars rise to meet the upper molars as these teeth approach the condyles. In articulating an entire set, the lower cuspids should close between the lateral incisors and cuspids of the upper plate; the first bicuspid lower, between the cuspid and first bicuspid upper; the second bicuspid lower, between the two upper bicuspids and so on to the end, making the teeth break joint as bricklayers term it. When this is found difficult to accomplish, where the teeth are placed on the plates regularly, a tooth may be twisted or lapped; or a tooth may be left out, or a space left rather than not to accomplish this articulation. The six lower front teeth should not strike the six upper front teeth, but should be distant from them about the thickness of a cardboard. The pressure should be on the two bicuspids and first molar of each side and these should strike simultaneously. The second or last molars should barely touch.

CUTTING CAVITIES IN ARTIFICIAL TEETH.

DR. H. B. BARTLETT, OWENSBORO, KY.

Items of Interest, April.

In cutting cavities in artificial teeth use a copper disk one fourth to three eighths inch diameter, mounted on mandrel, with medium grade carborundum powder and a little water.

After grinding the enamel, with an ordinary stone, the size which it is desired to make the filling, take the small copper disk and powder and cut two grooves for undercuts, holding the disk at different angles for each groove. This makes a very satisfactory cavity, and does it in from three to five minutes.

TO MAKE CAVITIES IN ARTIFICIAL TEETH.

DR. H. T. NORDAHL, ELGIN, ILL.

Dental Review, December.

A plugger point is sharpened to a flat drill on a corundum wheel; it is tempered by heating to a cherry red and plunging in mercury. The tooth to be excavated is embedded in plaster. The glaze is removed by means of a corundum wheel from the position the filling is to occupy. Wet the chisel in campho-phenique or in turpentine, and with light, rapid blows from the mallet, revolving the chisel, the cavity is readily excavated.

TO DRILL ARTIFICIAL TEETH.

DR. S. O. SAWYER, TRAVERSE CITY, MICH.

Ohio Dental Journal, August.

In drilling cavities in artificial teeth, when without diamond point, pulverize worn-out carborundum wheels, mix with oil and note how much faster the bur will cut than with oil alone. The shank of a small bur ground into a three-faced drill will cut the groove perhaps faster than anything else; of course, cut out as much as possible at first with a small carborundum disk.

IMITATION GOLD FILLINGS IN ARTIFICIAL TEETH.

DR. G. T. CARPENTER, CHICAGO.

Dental Digest, February.

Instead of making cavities in artificial teeth, and filling them, the writer swages a piece of 30 gold plate to fit a corner, or any other part of a tooth where the filling is to be, and allows a flange of the gold to pass into the wax base, which will be engaged by the rubber and held in place. The gold is burnished down close to the tooth.

ARTISTIC STAINING OF ARTIFICIAL TEETH.

DR. GEO. H. WILSON, CLEVELAND, OHIO.

Ohio Dental Journal, March.

Any one desiring to begin this work can purchase either the Poulson or Ash & Son's set of colors through the dental depots, or the materials to be named, at any of the art stores.

Two lists are given: The first is recommended only to the novice. The second to be procured as the emergency requires, or the novitiate's ambition dictates.

First. Sepia; light gray, No. 1; ivory black; oil of cloves; alcohol; one small pencil brush; one stippler brush; one spatula, horn or steel; one glass slab.

Second. Rose pompadour (gum color); ivory yellow; brown yellow; celestial blue; and relief white. These colors are the Lacroix, except the relief white, which is Dresden.

All mineral paints have to be burned into the porcelain. This process is described later on.

The use of the various articles: A plain glass slab, on which to mix the colors in small quantities; a spatula with which to grind or mix the paints together, or with oil; a stippler brush, a short, stubby square end brush, with which to spread or even the paint by striking (stippling) with the end of the brush; alcohol with which to clean the teeth, the brushes, and to remove the waste paint from the slab; oil of cloves, to thin the paints as necessary for the desired effect. There are other oils that can be used, as oil of lavender, fat oil of turpentine, etc., but the oil of cloves is probably already in the office. Gray and black are the foundation colors of nearly all the work we will probably be called upon to do. The ivory black will rarely or never be required by itself, but is used to deepen the color of both gray and brown. A very little black will have a decided effect, and should be thoroughly mixed before applying.

Observation of the natural teeth in the mouths of patients is absolutely necessary to distinguish the brown and gray shades; also a little time must be spent in the laboratory in studying the effect of a thin coat and a thick coat of each of the colors, and more especially to note the effect of the stain upon the original color of the porcelain tooth. If the tone of the tooth is yellow, and brown is added, it will not only deepen the color but will bring out a most decided brown color; but if the tone is blue, or gray, then the brown would first deepen the original color, blue or gray, and would only give a decided brown, as quite a quantity had been added.

The study of the fact just mentioned means the success or failure of staining porcelain teeth. Mastering this point means successfully producing in the laboratory what the eye for color has seen at the chair is needed.

It must not be supposed that this method can be used in all cases; it is the exception and not the rule. There are two classes of cases to which it is especially applicable. The one where we have not at hand such a set of teeth as we desire in color. We can deepen the foundation color, change the tone from gray to brown, or brown to gray, and vary these from a light tint to a very decided one. It should be borne in mind that an underglaze color is not produced, but one upon the surface; hence its legitimate use is to produce stained teeth, which are more suitable for middle and aged people, than for the translucent effect of earlier life.

The stains can be largely removed by the use of sandpaper, or by the severe use of the felt wheel and pumice. It is not necessary in the proper polishing of vulcanite to remove the stain, but by an indifferent use of the sandpaper and pumice, a portion of stain will be removed, but not by any use the denture can have in the mouth. The other class is in partial cases, to reproduce peculiarities of the natural teeth. It is not uncommon that there are brown and gray discolorations in the same tooth, as brown at the gingival portion and gray at and near the proximate surfaces, ranging from incipient black decay upon the proximate surfaces, appearing gray through the translucent enamel, to the more extensive gray color of leaking fillings.

Desiring to change the tone of the tooth, or give a deeper shade, it will be necessary first, to remove all wax and clean the tooth with alcohol, drying it with a clean cloth, then hold the tooth by the pins in a pair of pliers; having mixed the color with oil of cloves, either thin or thick, as a light or dark shade is desired, apply with the pencil brush. The paint can be more evenly spread with the stippler brush. The surface should be gone over with a stipple motion, that is, striking with the end of the brush, the brush being held at a right angle to the surface of the tooth. At any place that the paint is not heavy enough, more can be added by the pencil brush and then stippled. If the color is too heavy at any portion of the tooth it can be removed by wiping lightly with the end of the finger and then stipple. When all of the teeth are so treated they are placed upon a slab to dry.

To fix the color and give it a glazed surface, it is necessary to subject it to a high heat, about 2000° F., or the fusing point of gold. This burns out the oil and fuses the solid particles of the stain which unites with the surface of the porcelain. It makes little difference how this heat is obtained, if evenly applied, that is, not so suddenly as to fracture the tooth. Having thoroughly dried out the oil by placing the fire-clay slab over the Bunsen burner, the teeth can be safely subjected to the higher heat, and brought to the proper temperature in two minutes time. Any furnace can be used, or, not having one, any one having a blowpipe can easily improvise one at small expense. Get a piece of fire-clay slab about an inch thick, upon which the teeth are placed, with the pins resting upon the slab. Shape a piece of No. 36 standard gauge platinum plate, so as to cover and enclose the teeth, except one side, which is left open as a peep-hole.

This miniature oven or furnace, containing the teeth just from the brush, is placed over the Bunsen burner for about five minutes, when the flame from the blowpipe is placed against the under side of the clay slab, gradually bringing it over upon the top of the platinum. Two minutes' work of the blowpipe should suffice.

Take away the blowpipe and turn off the flame of the Bunsen burner at once, remove the platinum cover and permit the teeth to remain upon the slab till they are sufficiently cooled to handle with the fingers without discomfort, when the work is finished. The work will require less time than telling it.

While the instructions given have been for evenly shading the teeth, by the same process, that is, laying on with the pencil brush, whipping off with the finger, and stippling, any result desired can be produced.

If it is desired to combine colors, a sample should always be burnt to know what the result will be. Thus the ivory black will deepen the gray or brown according to the amount of black used, but if we combine blue and yellow, we will get green, then by modifying this green with brown, we will get the peculiar green stain so often found in the mouth.

Salivary calculus effect can be produced by laying on the relief white without thinning with oil, burn on and then stain with brown. White spots or an over deposit of lime salts can be represented by a thin layer of relief white stippling and burning in. Atrophy and worn conditions are produced by grinding and then staining.

Gum color, either light or dark color, according to the amount of rose pompadour used. A still lighter effect can be produced by building up the portion representing the gum, with some white body as No. 1 of the Downie bodies; bake it on, then paint with the gum color and fire.

Success in imitating gold fillings has not been good. Precipitated gold is the form of gold accompanying the English and German sets; they appear perfect when first applied, but will not stand the wear necessary in the mouth. Dr. Grant Molyneaux says the chlorid of gold will withstand the wear. To burn on the gold will require about 500° less of heat than the other colors mentioned.

BACKING TEETH.

Ash's Quarterly, June.

When backing a tooth, countersink the back and rivet with a fine-edged hammer, supporting the tooth meanwhile on the edge of a piece of lead held in a vice. This is better than splitting and spreading the pins, as some recommend, because the borax and solder are more easily kept from flowing through the back and fracturing the tooth. In soldering use a jeweler's wig, on which is placed a sprinkling of asbestos fiber to prevent the discoloration and cracking of the teeth, the soldering being done without investing. The teeth are then allowed to cool, and the backs are filed up before the teeth are waxed in position on the plate. When in position, the teeth are invested in sand with a slight admixture of plaster, and the final soldering is done in the usual way.

TO REPLACE BLOCKS OF TEETH WHERE THE PINS ARE BROKEN OUT.

DR. F. E. BATTERSHELL, PHILADELPHIA.

Ohio Dental Journal, April.

Take a piece of 22k. gold wire, twelve to fifteen gauge, cut two bits of sufficient length to reach across the thickness of the approximal surfaces of the block, and project into the rubber. Rivet-head both ends. With fine wheel, cut circular notches on either side of the block large enough to allow the pin to pass through between it and adjoining block into space for rubber. Cut these notches near or into border of tooth; and when the work is completed, and the clinching rivet-head finished it will resemble a neat filling of gold. Also the block will be more secure than with the original pins. Sample pinless blocks may be thus used.

RULES FOR SELECTING TEETH.

DR. THEO. CHUPEIN, PHILADELPHIA.

Dental Office and Laboratory, September.

A person with light or blue eyes and light hair will require clear white teeth. One with thin lips and a sharp, or pointed nose, or thin delicate features, will need narrow teeth. For dark hair and dark eyes, dark teeth are indicated. A full broad face will require short broad teeth. Thick lips and flabby cheeks require teeth that are thick on their cutting edges.

GRAVER FOR VULCANITE.

DR. JOHN G. HARPER, ST. LOUIS.

Dental Review, June.

A double-pointed graver for finishing vulcanite. It consists of an ordinary chisel with its edge cut into a V shape, giving two edges and points to work upon.

CROWN AND BRIDGE WORK.

TO PREPARE LIVE MOLAR FOR BRIDGE ABUTMENT.

DR. W. H. BAILEY, MENOMONIE, WIS.

Written for The Compendium.

With knife-edge carborundum disks of different sizes cut a longitudinal groove on both lingual and buccal surfaces as near the gum as possible, and as deep as necessary without becoming too sensitive; cut another groove across the grinding surface. With one beak of excising forceps in the groove on the grinding surface, and the other beak in the lateral groove, the enamel can be removed quickly and with but little pain, leaving only a small ring of enamel at the gum margin, which can be easily removed with small carborundum stones or root-trimmers.

TO PROTECT LIVE BRIDGE ABUTMENTS AGAINST CEMENT.

DR. W. H. BAILEY, MENOMONIE, WIS.

Written for The Compendium.

Just before setting a bridge or crown over a live tooth, coat the entire surface with a varnish made by dissolving rosin in chloroform with a little eucalyptus added.

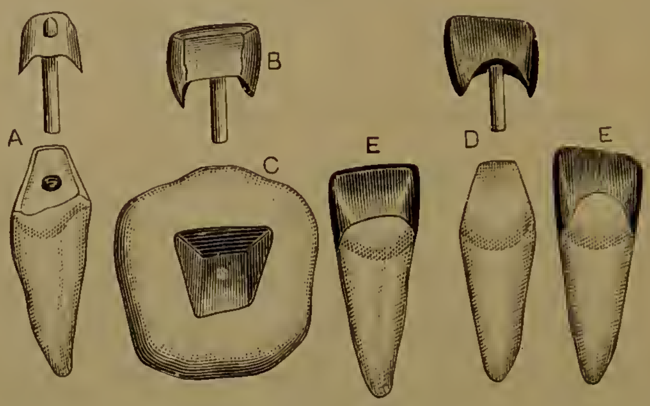
CAST FILLINGS AND ABUTMENTS FOR BRIDGES.

DR. C. L. ALEXANDER, CHARLOTTE, N. C.

Dental Cosmos, October.

The demand is made for a successful method of dealing with a class of teeth that cannot be satisfactorily treated with the old method of filling and crowning.

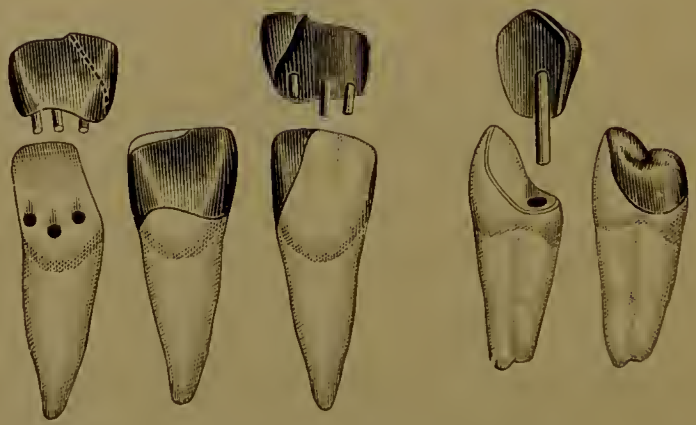
FIG. 1.



Showing details of the process for making cast filling for incisor. A, post with plate adapted; B, restored contour in wax; C, the contour invested; D, cast contour detached; E, E, the finished restoration.

Attention is called to a new method by which it is possible to perform an ideal class of work.

FIG. 2.



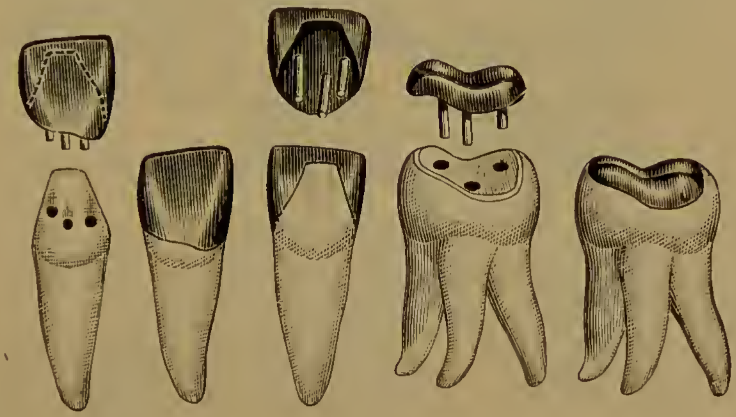
Restoration of incisor by cast filling.

Restoration of molar by cast filling.

The fundamental principle is an old one, that of fusing and flowing metal over platinum sheet or foil. The method consists in detail of burnishing platinum over the surface to be restored;

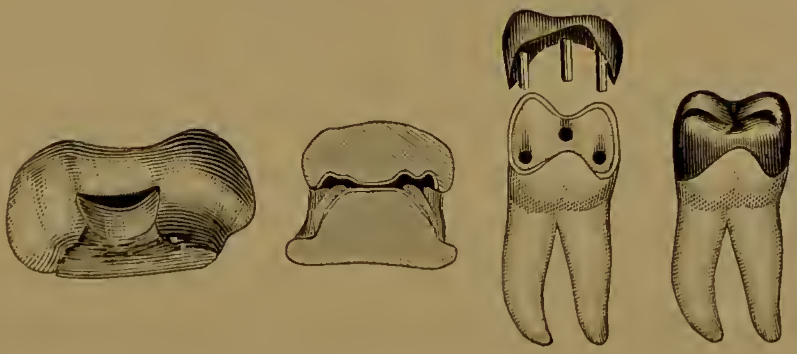
the holes for retaining posts having already been made, can easily be located and the posts adjusted therein. Then, by heating a little modeling composition over a spirit lamp and pressing it firmly down over the surface and allowing it to cool, we can remove the platinum sheet and posts in correct relation to each other. Now invest and solder the posts with pure gold. The piece is again placed upon the tooth in the mouth, and after carefully trimming and reburnishing, an impression is taken, and when an occlusion is needed, it is made at the same time by the patient closing the teeth together before the impression material has become hard. The metal foundation will be drawn out by the

Fig. 3.



Front and back view of an incisor restoration, and cast filling for molar.

Fig. 4.

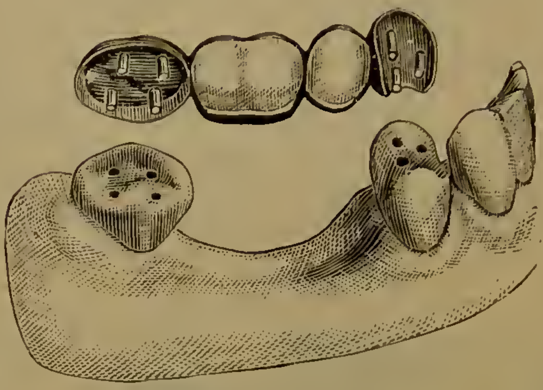


Foil matrix invested.

Cast filling for molar,

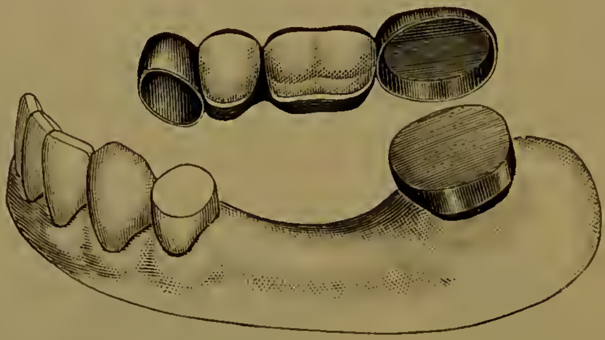
impression compound when it is removed from the mouth. Each side of the impression thus secured is filled with any good investing material and placed in an articulator. After heating and removing the impression material, you can restore the contour of the tooth by building up with wax. Over the wax surface thus formed burnish gold or platinum foil; if the former, it should be very heavy, say No. 60. A suitable portion of the wax being left uncovered, the work is cut away from the model and invested, with the exception of that part of the wax left uncovered by the metal. Through this opening all the wax is boiled out, leaving a matrix lined with metal, which acts as a carrier for the metal which is placed and fused within. Use 20 or 22 carat gold solder for this purpose. When pure gold is used, of course the matrix must be lined with platinum throughout. When removed from the investment, the casting is finished and cemented to its position on the tooth, and then given a final finish. In bicuspids and molars it is frequently more convenient to stamp up the cusps, using pure gold, 35 gauge for this purpose, as it can readily be made to conform to the grinding-surface of the occluding tooth.

Fig. 5.



Method of bridging with inclined abutment.

Fig. 6.

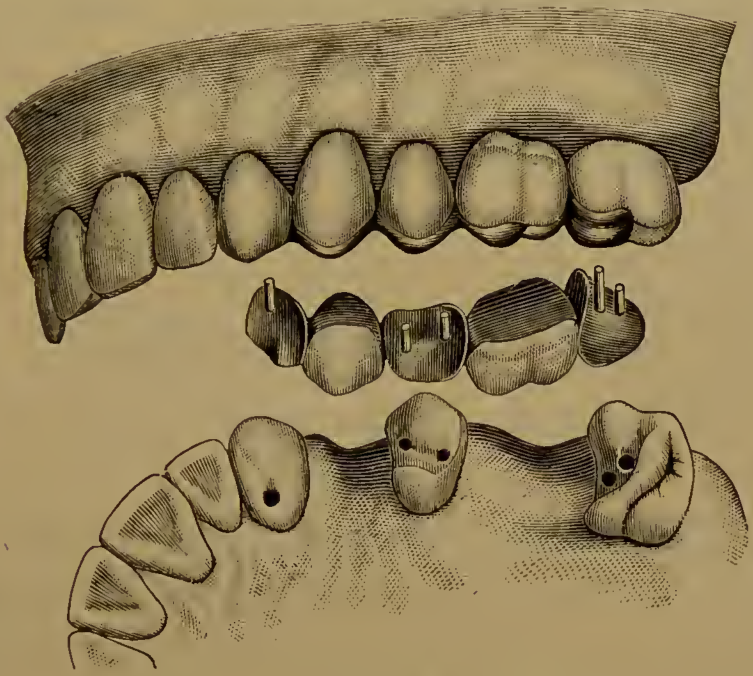


Usual method of bridging with inclined molar abutment.

Abutments for bridges (see Figs. 5 and 6) are practically made in the same way as the cast fillings, and when finished they are placed in position upon the teeth and a model secured, from which the bridge is made in the usual way. The abutments of a bridge should be made of a higher fusing metal than the bridge proper.

In bridge work the advantage gained by using the cast abutments is so evident it is only necessary to say that by the use of this system tooth-structure is saved in all cases, a display of gold from the labial aspect is avoided, and a light and substantial piece of work is secured, free from overhanging margins, which provide a lodging-place for food substance, a bed for the development of bacteria, which eventually brings disaster to the bridge, defeating the very object we had hoped to gain.

Fig. 7.



Bridge with cast filling abutments.

By the application of this method, bridging inclining teeth (see molar in Fig. 5), even when the incline amounts to a deformity, becomes an easy matter, the operator having only to be careful to drill the retaining holes for the bridge-posts parallel with each other. In operative dentistry many cases are presented where it is almost an impossibility to restore the lost part of a tooth by the old and accepted methods of filling.

We can easily extricate ourselves from this embarrassment by constructing metal castings for these special cases, and it is for these extreme abnormalities this class of work is recommended, and he insists that it must be adopted or the profession stand the odium of being unable to meet the demand made upon it or of being unfatihful to those who have placed their teeth in its care.

Perfect results must not be expected at the beginning; it will require time and careful manipulation to make a success of it. Your trained hand will soon grasp the situation, and you will be able to accomplish in an artistic and beautiful manner results which will be surprising, and in one half the time required by the old methods. So far, the chief objection urged against the cast work is the possibility of the cement not standing. In refutation of this objection, can only say that the adaption of the casting to the walls of the tooth, when made properly, is so perfect, it is hardly probable that we will meet with any trouble in this direction.

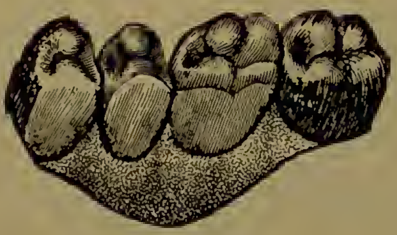
REMOVABLE BRIDGE.

DR. B. J. CIGRAND, CHICAGO.

Ohio Dental Journal, July.

The buccal cases referred to in particular are those where the second bicuspid and first molar are missing, in either the upper or lower jaw, and where the adjoining teeth are possibly affected by decay. The method of construction is simple, and there are many cases to which the system is applicable. The case in question, an upper right, Fig. 1—trim down the first bicuspid and if necessary devitalize same, and give it the shape of an ovoid pillar. Then proceed to treat the second molar likewise, shaping it into a cylindrical pillar. Then produce gold telescopes for these prepared pillars and cement them in position. Next construct a gold bicuspid and molar crown having a solid cusp and of such a shape as to perfectly envelop the golden pillars. Position these crowns and take an impression and the maxillary antagonism, and proceed to swage a gold saddle connecting the two gold crowns as in Fig. 2. Now solder

Fig 3.



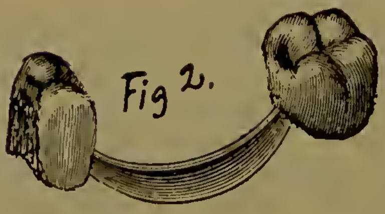


Fig 2.

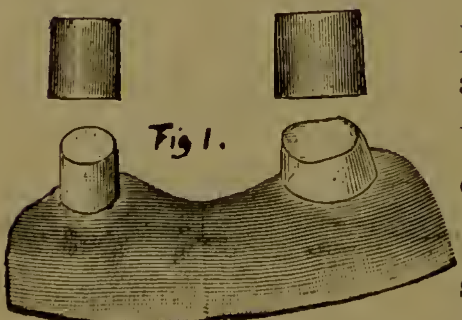


Fig 1.

the saddle to the crowns and proceed to occlude the artificial second bicuspid and first molar (tipping same with gold cusps); wax same into proper position, and after investing the case in the usual manner join the entirety with gold solder; finish up as your judgment well directs.

If it is desired to construct the same detachable bridge denture and employ vulcanite to hold the artificial substitutes, the process of construction is slightly different. In this event the earlier stages of construction are the same as already described, differing only subsequent to attaching the saddle to the two gold crowns. Several platinum pins are anchored in the gold bicuspid and molar crowns and a bar of silver, acting as a truss, soldered into a position as will not interfere with the setting up of the plain teeth.

After waxing up the case, flask it and pack pink rubber on the buccal surface and maroon on the palatal; vulcanize and finish as a metallo-vulcanite denture.

The various modifications necessary to adapt this method to individual cases will readily present themselves to the conservative practitioners.

BRIDGE ARTICULATOR.

Dental Digest, August.

Dr. W. H. Bailey, Menomonie, Wis., says a pair of broken beak forceps make a good articulator for crown and bridge work.

IMPROVED PORCELAIN BRIDGE.

Stomatological Gazette, October.

There is a practical idea in the construction of a porcelain bridge by Dr. A. H. Wallace. The two abutments were gold crowns. A piece of platinum was swaged to fit the ridge and to extend upon the sides of the crowns. A bar of platinum was soldered between the upturned ends of the plate or saddle. The teeth were soldered to the bar, porcelain (Close body) was baked to the proper contour. The piece was placed in the mouth, the crowns in position, waxed together, removed, invested and the crowns soldered to the platinum plate.

REPAIRING BRIDGES AND CROWNS BY SOLDERING IN THE MOUTH.

MR. H. BALDWIN.

Dental Record, November.

The method of procedure is as follows: A rather thin porcelain flat tooth is selected and backed with No. 7 gold. The pins are cut short and riveted down into countersunk holes, and then still further attached to the back by melting gold solder over them. The back is then filed down perfectly flat and smooth. The old back remaining in the mouth is also trimmed smooth, all prominences caused by the old pins, etc., being burred down. The new tooth is let down till it takes its proper position in the mouth. The new back is faced with an excess of soft solder, by means of the soldering iron, which has itself been previously faced with the same solder. A piece of blotting paper is inserted under the bridge (if bridge it be), and allowed to project each way, to protect the gum and palate from radiant heat from the iron. A roll of bibulous paper is placed in the labial sulcus and a napkin applied in the usual way.

The old back in the mouth is then faced with the same solder by means of the soldering iron. Hydrochloric acid and zinc is used as a flux. The new tooth is then placed in position, held there by the finger, a small piece of bibulous paper intervening, and the solder is melted by touching the iron to the tips of the two backs where the solder comes to the edges. The iron must carry a bead of molten solder in its end. The union is known to be complete when the new tooth is felt to suddenly sink down into its exact position under the pressure of the finger. After each application of heat in the mouth, the work is immediately cooled off with a cold wet swab of cotton. Several other details to observe are the following: If the new tooth is to be next to a contiguous live tooth, see that both the backs, old and new, are just free of it, and place a single thickness of blotting paper between. See that the new back does not extend so far as to touch the gum. Let the back of the new tooth be as large as possible and its lateral edges not bevelled. See that in facing the backs with pearl solder, the solder be carried well over the cutting edges. See that the iron is as hot as possible, always provided it be not overheated and the facing of solder spoiled thereby. Test the heat of the iron by seeing that it will instantly melt bits of solder when pressed upon them. The iron must be very hot, so as to do the work quickly, and quickness is the soul of the process. When attaching the tooth do not attempt to conduct the heat through the old back, but apply the iron to the cutting edges of the backs, so that it comes into contact with the solder previously put upon them. This is the most important detail of all, as no amount of heat will do the work properly through the old back.

In this way a complete melting of the solder between the backs is effected, no matter how long the tooth. The length of time required to effect this is about two to four seconds, varying with the size of the tooth.

If the tooth after being soldered on is found to be in an incorrect position, it must be melted off again by again applying the iron to the tip of the new back, touching the solder, and pulling it forward with the iron. The reason for putting an excess of solder on the new back when facing it, is, that when it melts it allows the tooth to sink under the pressure of the finger, and so tells when the melting is properly done, and it also ensures there being plenty to fill up all the spaces. The excess is attracted away by the iron. It does not do to use a gold of less thickness than No. 7, as the solder in that case has a bad effect on the gold. In wear, the soft solder does not disintegrate nor suffer in any way, nor does it give rise to an unpleasant taste, but the bite must always be made quite free of the new tooth and of its back.

A STRONG BRIDGE.

DR. C. J. B. STEPHENS, GREAT FALLS, MONT.

Items of Interest, April.

When molars or bicuspids are to be replaced, and would not be plainly in sight, prepare the teeth or roots as for ordinary cases—swedge and fit crowns. Take an impression, remove crowns and place in the impression, and pour with plaster and pumice, or some other suitable material that will stand the heat, securing a cast with crowns in place. Then select plain vulcanite teeth, a little smaller than for rubber work, get the circumference of each tooth, with binding wire as a guide for the size of crowns, and swedge a seamless crown for each tooth.

Twist wire about the pins, letting the ends project two inches from the tooth, and press the tooth, face down, deep into moldine. Then withdraw the tooth by use of the wire, and place over this mold a small rubber ring, one half inch long, and pour with fusible metal, thus securing a die representing the cusps and buccal surface of the tooth. Place the crowns on a block of lead, and drive the die well inside to stamp the cusps and form the buccal contour· Remove the die, and press or gently tap the tooth firmly inside the crown, and mark with an instrument where to cut away the metal to expose the porcelain, leaving the cusps and edge of the tooth covered, so that the tooth cannot come through this opening. Remove the tooth and cut away the metal, replace again and cut away the surplus metal at the back, and grind both tooth and metal to suit the gums as in articulating. After proper articulation remove the porcelain and grind a little more from the back to allow for the thickness of backing. Replace the porcelain in the casing and burnish all edges well against the porcelain, articulate and invest for soldering. Before soldering fit inside the casing and against the porcelain a thin backing of pure gold plate or platinum and burnish well. Flux and solder crowns, casings, backings and all at once, uniting at all points. After cooling remove from the investment, finish and polish in the usual way. It makes a strong bridge, reinforced at all points, and is easily and quickly constructed.

There is less danger of checking the porcelain, and the porcelain cannot leave the bridge.

If a stronger bridge is required secure a die, swedge a piece of metal to fit the cusps on the casing, place and solder before cutting away the casing to expose the porcelain.

CEMENT FOR SETTING CROWNS.

Dental Headlight.

A saturated solution of sulphate of zinc, used with the powder of oxychlorid cement, is recommended for this purpose, as it becomes very hard.

DETACHABLE PORCELAINS FOR CROWN AND BRIDGE WORK.

DR. W. L. MASON, RED BANK, N. J.

Dental Cosmos, August.

Fig. 1 shows a lower cuspid crowned and cemented to its root. Fig. 2 shows its porcelain sliding from its backing. Fig. 3 shows porcelain and backing separate. This illustrates the mode of constructing the six anterior upper and lower teeth. In Fig. 3 we have a metal dovetail fitted perfectly to the back of the porcelain, and extending a little beyond its cutting point. It also shows its solid backing with a groove to receive the dovetail. It will

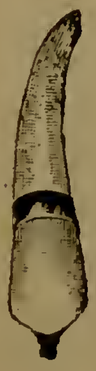


FIG. 1.

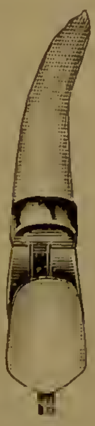


FIG. 2.

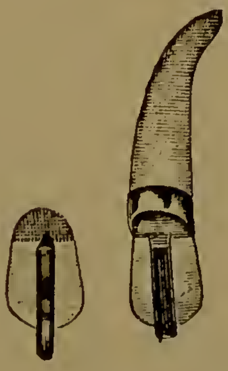


FIG. 3.

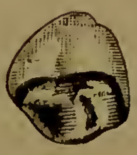


FIG. 4.

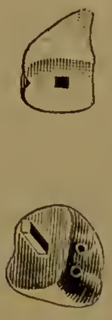


FIG. 5.

not be necessary to go into the details of the construction of the parts, but only that part of the work that is left to finish, as the porcelains with the metal dovetail attached and the grooved backing are manufactured. The tooth with its backing is fitted to the band by grinding out where necessary. Then wax the gold backing to the band, and, after the wax is hard, take hold of the extended portion of the dovetail and draw it from the backing. The crown is now ready to invest. Be careful to fill up the dovetail groove, and let the investment material come over the cutting point of the backing so as to keep out of it all solder.

Heat up, solder, and cool as quickly as you like. After removing from the investment see that the groove is thoroughly cleaned and dried; also the dovetail on the porcelain. Now take some chloropercha, quite thick, fill up the groove, and force the porcelain into position. Saw off (don't cut off) the extended portion of the metal dovetail. Then finish as usual. For use as a dummy articulate to position and join the parts with wax. The condition for the posterior teeth is changed somewhat. Fig. 4 shows a molar dummy, with its cusp and porcelain together, having the same general appearance of the molar dummy in general use, with the exception that the porcelain takes up more space on its palatal portion, making a saving of gold.

Fig. 5 shows the dummy parted, giving a view of the joining parts of a solid gold cusp, the upper buccal portion sloping upward and backward toward the ridge, and having on its face a square pin extending forward and upward. Fig. 5 also shows a porcelain with a square hole extending from the surface just above the cusp portion, upward and outward to receive the square pin fitted to the cusp. After placing the cusp and porcelain together, the dummy is ready to grind into position. Wax the parts together, remove the porcelain, and solder. Afterward cement the porcelain to the pin and finish as usual. The advantages gained by this method are many, and can only be appreciated by the practice of it.

The first advantage, the teeth are not placed under the flame of blowpipe.

Second: A solid backing without bubbles, as all parts are drop forged.

Third: Can heat up invested piece quickly, and not have to take the usual care; can also cool off quickly.

Fourth: The small amount of solder used—just enough to join the parts together.

Fifth: Saving porcelain from being etched by borax.

Sixth: Ability to fit a bridge, releasing the strain by cutting and resoldering, and not have the porcelain interfered with.

Seventh—the most important of all: The amount of time saved to the busy dentist will equal about half of the time spent in the old method, and being free from annoyance in spending part or whole of a day repairing a bridge, with this system the repair is but a matter of a few minutes. If a tooth of mold No. 22 is put on, and it should break, you may order an exact duplicate and slip it in position, keeping yourself in a good humor, and giving your patient the greatest amount of satisfaction.

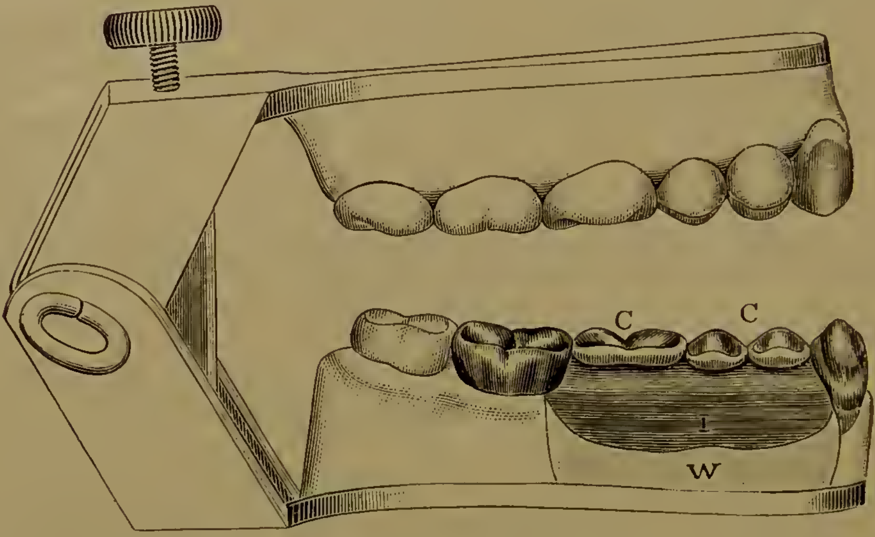
A NEW DEVICE IN CROWN AND BRIDGE WORK.

DR. HARRY C. SPENCER, CHELSEA, MASS.

Dental Cosmos, September.

In this method an assortment of bicuspid and molar cusps is the important factor. These should be shell cusps (not solid), and may be made by taking impressions of natural teeth in moldine, running metal dies, and striking up in the ordinary way, using for the cusps aluminum or any metal which the operator may prefer. The usefulness of these cusps in bridge-work will be made apparent by referring to the accompanying illustration. This shows the lingual surface, the second molar and cuspid being gold-crowned, and the space between occupied by a molar and two bicuspid facings—already backed. The wax is represented by W.

Impression compound is now warmed and placed over the wax. A cusp corresponding in width to the molar facing and in form to articulate with the occluding tooth above is selected from the assortment, placed in position on the soft compound, the articulator closed together, and the cusp forced in position (c, cusp in position; i, impression compound). The bicuspids are now treated in the same manner. If the compound has become hard in the meantime, simply warm the cusps. The metallic cusps are now removed, which may be easily done if the compound has been previously coated with French chalk or vaselin. This brings to view perfectly formed cusps in impression compound, from which, after it has become hard, an impression is taken in moldine as they stand on the model, a metal die run, and the three cusps struck up in one piece out of gold. These gold cusps are now placed on the model, occupying the same position as the trial cusps which were removed. It may thus be readily seen that if the gold cusps are made the same gauge as the trial cusps, a perfect articulation is assured, the thickness of the gauge of gold even, not intervening, the gold cusps having simply replaced the trial cusps. While (for the sake of illustration), if it were desirable to prevent the molar shown in the illustration from occluding with the tooth above, leaving only the bicuspids to act, a thicker trial cusp (say 28 gauge) might be used for the molar and 30 gauge for the bicuspids, the whole being replaced by 30 gauge gold cusps, which would leave the molar a trifle shorter (the difference between 28 and 30 gauge). The whole bridge, after being properly waxed, is removed, invested, and soldered as usual, the work being accomplished artistically as well as quickly and accurately.



In crown-work this method may be used in the mouth or on the model. The band is made as usual and put on the tooth. The occluding end being filled with soft impression compound, a cusp is selected to suit the case, pressed into the compound, and adjusted to articulate perfectly with the occluding tooth. It is then removed, the compound trimmed around the edge of the band if necessary, an impression is taken in moldine, a metal die run, and a cap struck up and soldered as usual.

Absolute accuracy of the trial cusp as to size is not a necessity, for if it be too large the cusp which it has formed in compound may be trimmed to remedy the deficiency, while, if necessary, the form of the trial cusp itself may be altered.

For cusps, aluminum works quite well, although any malleable metal may be used to advantage.

In making these cusps, extracted teeth may be used to form the dies, their decayed portion being first restored by compound; while if the tooth be first slightly coated with vaselin before taking the impression in moldine, the metal die formed will be more clearly defined. This also applies to the female die (if one be used), if the male die is first coated.

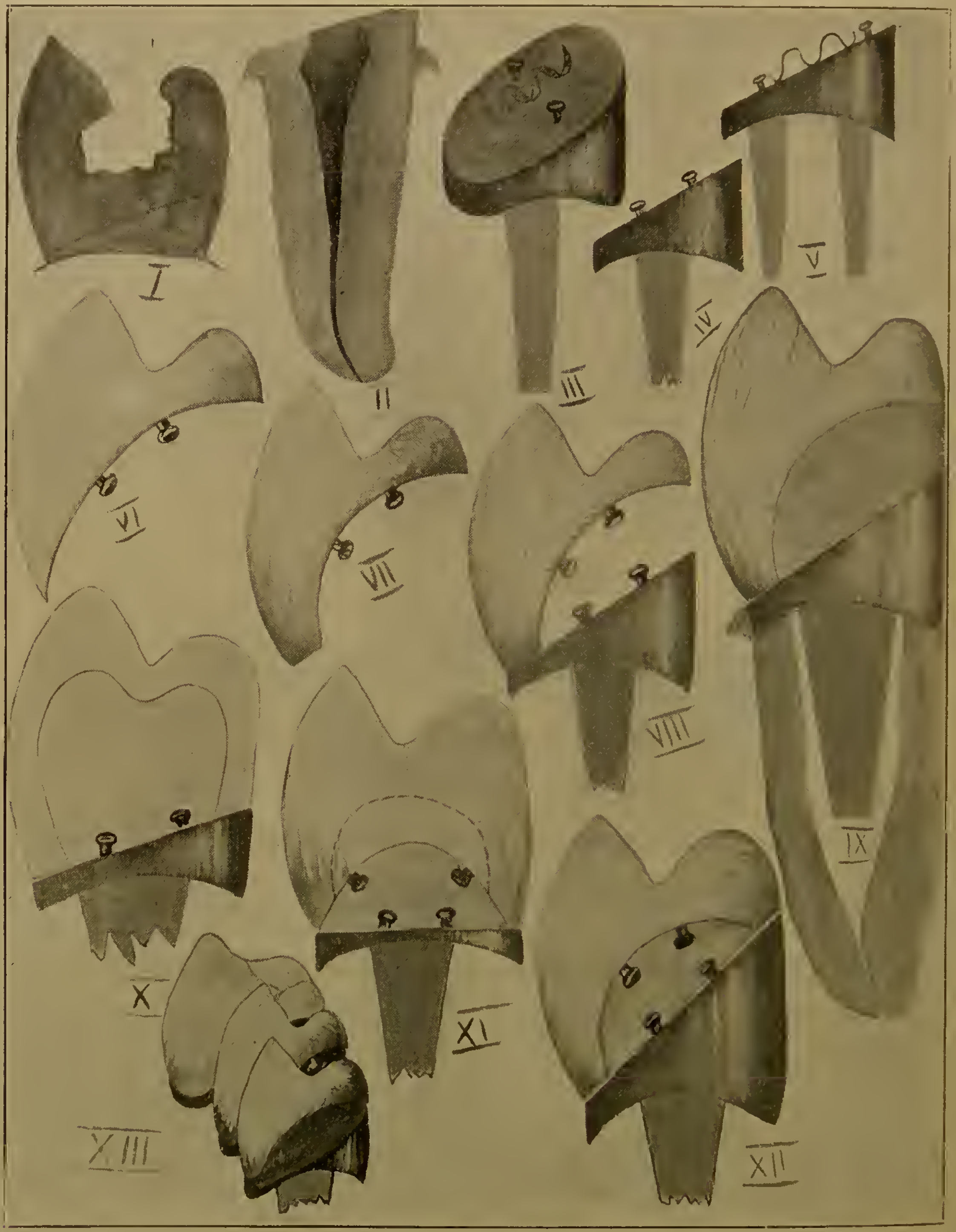
BICUSPID BAND CROWNS.

DR. B. J. CIGRAND, CHICAGO.

Dental Review, June.

The class of roots upon which its use is advised are the bicuspids whose crowns are badly decayed and necessitate the devitalization of the pulp. After fashioning the roots so as to leave it prominent on the palatal surface and beveling it toward the cervico-labial margin, as represented in Fig. 2, prepare the pulp canal as for the Logan crown. Then proceed to make a cope to properly envelop the exposed portion of the natural root and solder on the upper portion of the cope several platinum pins (taken from plain teeth), and on its lower surface a platinum post, as seen in Figs. 3–4; or if desired to increase the strength of the cope and further aid in anchoring the vulcanite, a small ribbon of gold or platinum should be soldered on to the superior surface of the cope, as shown in Fig. 5.

After having thoroughly polished the cope, position it on the root and select the proper sized, shaped and colored porcelain tooth, and grind its cervical margins as in Figs. 7–8; this will permit it to accurately fit the inclined surface of the cope. By means of wax



placed on the cope, the tooth can be held in place and perfect occlusion can be attained. If at all possible remove the cope with the tooth still in position, then thoroughly wax up the interspace between the tooth and the cope and invest the crown in the dental flask, remove the wax and pack the space with black rubber, or maroon rubber; vulcanize the case, and after giving the gold and vulcanite a polished surface, lodge the crown on the root and fasten it with oxyphosphate. This will give a neat, serviceable substitute, free from interspaces which might lodge foreign matter.

If it is desired to produce one of these crowns so that the vulcanite will be invisible on either the labial or palatal surfaces it can be accomplished by grinding the palatal surface of the tooth and extending the lingual surface of the cope to join with the tooth as represented in Fig. 12, or by using the Howland crown (porcelain Fig. 10), packing the chamber with rubber and treating it as the preceding case. The countersunk tooth (Crescent) can also be used to good advantage in this method of crown-work, as shown in Fig. 11. A crown similar in construction, yet void of vulcanite, can be made by using the saddle-backed porcelain plate teeth; adapt a piece of gold, thirty gauge, to the concave or saddle portion and then fashion the cope so it will perfectly fit the gold on the plated tooth. After the cope has been adjusted, remove the tooth and solder the cope; then properly polish the latter and position the porcelain tooth on the cope and clinch the pins of the tooth to the cope; thus you have a metal porcelain crown without having subjected it to the blowpipe or furnace.

This crown can also be used in conjunction with bridge dentures, especially where it is intended to replace the bicuspid teeth; the method for bridging is so near like that of crowning that it would be superfluous to enter into further description.

Those who have a furnace for baking porcelain, (Fig. 13) can employ this system for crown-work and produce a very neat crown by making the cope of platinum, and instead of attaching the porcelain by means of the vulcanite, can do so by filling the interspace with body and subsequent to baking the enamel, polish the metal and a most perfect crown will result.

OPEN-FACED CUSPID CROWN FOR BRIDGE ATTACHMENT.

DR. FRANK L. PLATT, SAN FRANCISCO.

Stomatological Gazette, January.

The construction of an open-faced crown for cuspid tooth, to be used as the anterior support for a bridge reaching from the left superior first molar tô cuspid.

The tooth being so trimmed that its circumference is nowhere greater than at the gingival border; its cusp shortened and beveled from the palatal to the labial surface; the palatal portion cut away sufficiently to allow of proper articulation with the inferior teeth after the crown is in position, and crossed at its upper portion by a horizontal groove of moderate depth; a cylinder of 30-gauge, 22k gold plate is accurately fitted. This is then trimmed to correspond with the festoon and neck, just under the free margin of the gum. The labial and palatal sides of the cylinder are then cut away, leaving a rim of gold of sufficient width to insure a good degree of strength, and projecting from it on each side a strip of gold covering the proximate surfaces of the tooth and reaching a little below its cusp. The sides are then burnished closely to the tooth and trimmed with a corundum wheel while the band is in position on the tooth to correspond closely with its palatal surface, and the projecting ends cut off just even with the cusp.

A piece of 30-gauge pure gold plate is then soldered to the palatal side of the band at its upper portion, the partially constructed crown placed in position and the gold backing burnished carefully to the palatal side of the tooth into the horizontal groove cut across it, bent outward over the cusp, so as to meet the proximate sides of the crown. The crown is then carefully removed and the backing firmly soldered in position.

The original contour of the cusp of the tooth is then restored by soldering to the crown, when it is burnished over the cusp, one or more small pieces of 22k plate, and the whole crown smoothed and strengthened by flowing solder over the entire palatal surface of the backing. The contour of the proximate sides of the crown may also be restored in the same manner, if the space between the lateral and cuspid is so great as to demand it.

Such a crown as this is very easily made, and as no impression or model is necessary, and the crown fitted upon the tooth at each successive stage of its construction, an accurate fit is assured. There is also no possibility of the crown slipping up on the tooth and irritating the gum, as is too often the case when the cusp of the tooth is not covered.

CARBORUNDUM POWDER IN CUTTING OFF CROWNS.

DR. H. B. BARTLETT, OWENSBORO, KY.

Items of Interest, April.

It is valuable in preparing teeth for crown and bridge work. By using a small copper disk one-fourth to three-eighths inch in diameter, mounted on mandrel, with the medium grade carborundum powder and a little water, grooves may be cut around a tooth very quickly, and almost as easily as if the tooth were chalk, leaving but little for the incising forceps to do, and with scarcely any pain.

GOLD PIN FOR CROWN.

DR. W. H. BAILEY, MENOMONIE, WIS.

Written for The Compendium.

A thin piece of crown metal, or 24-carat gold, rolled into a tapering cylinder or cone, by bending around the point of an excavator, and filled with hard solder, makes a good pin for porcelain face crown.

TO MAKE A GOLD CROWN.

DR. H. W. ALLWINE, OMAHA, NEB.

Dental Digest, September.

Prepare the side of the crown so a wire measure at the neck may be removed without breaking the wire. Then take a plaster impression of the tooth. Place around this a metal ring. Fill the impression of all the teeth, except the one wanted, with plaster. From the tooth wanted, bevel the plaster to the upper edge of the ring. When this plaster is hard and dry, pour into it Melotte's metal. Now cut away the metal well up the side of the tooth, representing the cervical margin of the gum, so the band will pass well up. Dress the side of the crown so that the wire measure will pass over the metal tooth as it did over the natural one. This wire measure, cut and straightened, is the length of the gold required for the band. Fit the band down well all around and leave it long enough to extend just over the turn of the grinding surface. Scrape from the grinding surface of the metal tooth the thickness of the gold wanted here. Hammer and burnish the edge well down to metal tooth and file it to a sharp edge. Now contour as desired. Place the band back on the metal tooth and, with hammer and soft wood, drive a piece of well annealed gold to a perfect fit over the cups and end of the band. Solder and dress down. Any broken-off molar or bicuspid may be thus capped if it be first built up with cement.

SWAGING GOLD CROWNS.

DR. W. H. JACKSON, ANN ARBOR, MICH.

Written for The Compendium.

The operation of swaging the contours of gold crowns is greatly facilitated and much more neatly done by using, instead of lead or tin, a double thickness of unvulcanized rubber (such as is used for plates) to drive the gold into the die. One good blow is generally sufficient, and if the gold is well annealed, it will seldom have any cutting at the edge of the die. The rubber should be about the size of the opening of the die.

JACKET CROWNS.

Such crowns are so easily made and are so serviceable, as well as natural looking, they should be more generally used. They are especially adapted to the front teeth with live pulps, but may be used successfully for bicuspids by using a rubber tooth ground out for the facing.

To crown an incisor, grind the stump slightly conical laterally, grind the labial surface sufficiently to accommodate the porcelain facing, which can be made very thin by grinding. The lingual surface may be ground a little to reduce any projections there may be on it. After finishing the shape of the stump, fit it with a platinum band long enough to reach nearly the original length of the tooth, solder with pure gold, place band on the stump, pass it slightly under the edge of the gums. With sharp-pointed scissors slit the exposed end of the band in several places down to the stump; turn the slits in one on the other, burnish the cap as it stands to the shape of the stump, remove and flow some pure gold to unite the slits, replace the cap. Mix some Close or Downey body to the consistency of putty, place it on the facing and press facing in position, remove very carefully, place in the furnace and biscuit; remove and add body to properly contour the tooth and bake. The finished crown requires but little cement for setting.

JACKET CROWN AND BRIDGE TOOTH. OTHER PRACTICAL USES OF PORCELAIN.

DR. A. C. M'ALPIN, WARREN, PA.

Dental Practictioner and Advertiser, January.

The operations described are those in which porcelain work is most valuable. In these the jacket crown is used. Teeth that have been repeatedly filled with metals and have as often failed, can be restored to their natural appearance and use without disturbing the living pulp. When the natural crown has decayed beyond the metal filling, and the tooth is yet alive, or the crown is undeveloped, or is irregular in form, or twisted in its socket, or slightly out of position, or worn away by friction or erosion, it can be crowned and regulated without sacrificing the pulp, and with a crown whose facing has the firmest attachments throughout its entire palatine surface, thus making the strongest porcelain-faced crown known. These crowns are so constructed that easy access to the pulp in direct line with the root-canal can be had in case of subsequent trouble. They are commonly used only on the twenty anterior teeth, as gold crowns are usually practicable for the molars. The crown is made as follows: Reduce the natural crown to a size which will admit of a twenty-eight American gauge platinum plate over the entire palatine and approximal surfaces, and a twenty-two gauge porcelain facing. Obliterate the cervical ridge, then fit the cervical circumference of the stub with a thirty gauge platinum cylindrical tube (in making which lap the metal ends a little), solder this with pure gold, using as little as possible, place the tube on the stub, mark it on a line with the palatine surfaces of the approximating teeth and gums, and grind the tube inside the lines with a dry stone, to such thinness that it can be burnished to the stub without affecting the cervical adaptation. Then solder to this surface, with pure gold (using as little as possible), a twenty-eight American gauge platinum plate, this to form the entire palatine and about half the approximal surfaces of the crown. Then mark and grind the labial surface of the tube and adapt to the stub by pressure, without burnishing. Use for this an old amalgam serrated plugger, that the ground surface may remain rough for the adhesion of the porcelain, then grind the back of the veneer facing so that, when placed on the shell, it will be in the position required when finished. All platinum surfaces to which porcelain body is to adhere should be roughened with a dry stone. Remove the shell from the stub, heat it to white heat, to cleanse and prevent carbonation, which might discolor the facing, and place the facing on the shell in correct position, with the porcelain body between, and dry well before baking. Bake to a slight gloss only on the porcelain body, cool slowly and finish the same as in Richmond crown-work.

In attaching a bridge tooth to a jacket crown, allow the heavy palatine backing to extend across the space to be filled, roughen its labial surface with a dry stone, curl the edges slightly to stiffen them, and proceed with a facing as in the jacket crown.

For longer bridges, the jacket minus the porcelain can be made, but with pins attached to the labial surface, the bridge teeth soldered to them as in ordinary bridge-work. The facings can be put on the shells by the method explained, in the attaching of a cup facing. For replacing a lost facing from a bridge, which is broken, burnish a thirty-two gauge platinum plate to the bridge backing, with holes to allow pins to go through the plate; solder to this with pure gold (using as little gold as possible) two tubes of platinum made to fit closely over the pins. Attach to this the old facing or a duplicate, in the same manner as in attaching the facing to the jacket crown. Cement this on and you have a permanent repair without the trouble of taking off the bridge.

Some other practical uses for porcelain work may be found in fusing pins or porcelain buttons on blocks, repairing cracked blocks, contouring teeth and portions of gum sections, making two blocks continuous, coloring teeth with mineral stains or bodies, to match anomalous shades, painting gold fillings on artificial crowns, etc. In post crowns, perfect adaptation to the root with porcelain can be had by fastening the screw post in the root first, and proceeding as in the attachments of a cup facing, making the entire crown, with the exception of the veneer facing, of the porcelain body.

BANDING LOGAN CROWN.

British Journal Dental Science.

After preparing the root and fitting the pivot in the usual way, make a band of pure gold to fit the neck of the root, place a piece of wire or wood in the canal, and having put the band in position on the root, fill in the space with modeling clay and remove all together. Next melt some fusible metal and pour into a shallow vessel, and while still molten press the collar and clay into it, burying as much of the gold collar as fits round the neck of the root. When the metal is cold, the clay and wood or wire are removed, and the Logan crown is pressed into the collar, coaxing it down by burnishing the collar round it.

BANDING LOGAN CROWN.

DR. T. P. BELYEA, BROOKLINE, MASS.

Dental Cosmos, March.

A cap is fitted over the end of the root with a hole in it for the pin, then a narrow band is fitted to the crown. The crown is placed in position, and the band and cap fastened together with wax; the band and cap are removed, invested, and soldered, when the whole is put in place with cement.

SETTING LOGAN CROWN.

As perfect adaptation as possible is to be obtained by trimming the root and crown. Then pass the pin through a piece of warm gutta-percha. Warm the crown with gutta-percha in place, and press it to approximate position; remove, trim away excess of gutta-percha, warm again and press to position; remove and trim away any surplus gutta-percha. Dry the root-canal and cement the crown in position.

TO SET LOGAN CROWN ON BADLY DECAYED ROOT.

DR. J. W. PALMER, FITCHBERG, MASS.

Written for The Compendium.

When the root is decayed below the gum, and it is desired to set a Logan crown on it, press the gum away, shape the root, enlarge the canal, if necessary, and groove it. Place soft amalgam on the crown around the pin, and press the crown to position, remove and trim away surplus amalgam. Repeat the process of adding amalgam and pressing to place and trimming away the surplus until an accurate impression of the end of the root is had and the crown fits in position. Remove the crown, lay it aside till the amalgam sets; then smooth the amalgam with paper disks, cut out a little of it next the pin, and set with cement. If it is desirable to fix the crown in position at one sitting, mix the amalgam with cement, which will cause it to set hard enough in a short while.

PLACING NATURAL CROWNS ON ROOTS.

Stomatological Gazette, April.

Dr. Cecil Corwin, at a clinic, mounted a natural bicuspid crown on a bicuspid root. Two threaded pins were used. The joint of root and crown was ground flat, set with cement. Dr. Younger is reported in 1895 COMPENDIUM as doing this in shortening elongated teeth.

SOLDER FOR PLATINUM CROWNS ON WHICH PORCELAIN IS FACED.

DR. WM. H. TRUEMAN, PHILADELPHIA.

Dental Cosmos, March.

The addition of a few grains of platinum to pure gold makes a solder upon which pure gold will readily flow. Upon small work it is well within the compass of the laboratory blowpipe; on account of its high fusing, it is safer in the porcelain furnace.

PORCELAIN CROWN WITH GOLD CAP.

MR. T. H. ELLIOTT, GLASGOW.

Journal British Dental Association, June.

The tooth, a right upper lateral incisor, was cut down almost level with the gum, trimmed, and the circumference ascertained by means of wire twisted round the root. A narrow strip of gold was bent round and soldered to form a band, carefully fitted to the root and cut down very narrow in front, being well pressed up under the gum. It was then removed, and a top of slightly thinner gold soldered to it to form a cap. The root-canal having been enlarged with a pin-sized drill, the cap was replaced in position and burnished over root, thus indicating position of canal as a guide for the drill in piercing the, gold to receive the pin. The pin, a piece of tube pin wire, was fitted in the root to the required length, marked with an instrument at its junction with the gold, and then withdrawn; the cap was next removed, and the pin waxed to it, the length indicated by mark and soldered.

The surface of the root being finally trimmed level with the gum, the cap was placed into position by grasping with pliers that portion of the pin which projected from outside the cap and pressing well home.

A plaster impression was taken with the cap in place removed, and the cap placed into position in the impression. This was cast, a little colored soap lather being used to prevent adhesion, and when set, taken off by removing small pieces of the plaster, until the colored portion was exposed. The cap now occupied the exact position on the plaster model as it did in the mouth, and was not removed until the crown was finished, the tooth being backed, fitted, and soldered on the model, the latter being nearly all cut away except the two teeth adjoining the artificial one; a little plaster was run over the latter, and the two plaster teeth dried, heated up, and soldered in the usual way.

TO REMOVE RICHMOND CROWNS.

DR. R. M. SANGER.

Southern Dental Journal, December.

With a sharp spear drill, lubricated with glycerin, drill through the backing at a point over the pin. If the drill is well tempered this will not be very difficult. Enlarge this hole slightly with a round bur, then with a wheel bur cut the pin free from the cap. The crown can now be worked off without mutilating the band. Next, the pin remaining in the tooth root must be removed.

To do this bur away the cement around it with a fine spear-pointed fissure drill, being careful not to cut the metal itself. This should be done to a depth sufficient to allow a firm grasp of the pin with the sharp-nosed pliers. Do not attempt to draw the pin out by direct force, but twist it slightly to disintegrate the cement, when it will be found that the pin will come away with little effort. You have thus succeeded in removing the crown without mutilation.

When the root has been restored to a healthy condition, replace the crown, insert a platinum and iridium pin through the opening in the backing which was drilled to release the original post. Fasten into position with hard wax, remove carefully, invest, and solder.

SETTING CROWNS.

DR. E. L. CUSTER.

Before setting the crown wipe the gums around the root with a solution of perchlorid of iron, which will prevent weeping, protecting the cement till crystalized.

TO MAKE SOLID GOLD CUSPS.

DR. CEPHAS WHITNEY.

Items of Interest, May.

Proceed by removing sufficient material from occluding surface of tooth, providing there is any remaining, till a piece of metal, plate No. 27, placed on cut surface, will not interfere with occlusion. This refers to minimum cut on grinding surface only, the buccal, lingual and proximal faces being prepared as usual. Take ordinary double-pointed drawing compass (small) to measure width of band, by placing one point a little below gingival border, and the other point at buccal occlusal edge. Use this on gold plate as a gauge to scribe band, much like a carpenter uses his gauge.

Get the circumference, and solder in usual manner. After fitting band to tooth, level occluding edge with fine, broad, flat file, first getting the depth with excavator while on tooth.

Seal band, and with softened modeling composition placed in same, procure bite, being careful to have patient give all the movement of the lower jaw as in grinding. A little experience is necessary to trim this model neatly, from an esthetic, as well as occluding standpoint, it often being advisable to change its form in small details. It may be trimmed flush with the band on its sides. With wide No. 36 or finer saw remove model by passing saw close to leveled edge of gold.

Place pattern, cusp side up, on glass plate, oil well, surround with paper or rubber ring aud run the following composition over it to a depth of about three-fourths inch:

Plaster of Paris	6	parts
Plumbago	3	"
Asbestos (grade 3)	6	"
Soapstone (pulv.)	1	"

On removing from the ring, the composition pattern may be lifted from investment by using a pin, having previously marked the thickest place. Dry out in Lewis case-heater, or, if time is limited, carry to level, soldering pad, ball up sufficient gold, same carat as band, with blowpipe, to fill impression made by pattern, and press quickly but evenly down with large-faced hammer. You now have a facsimile in gold of the composition model. This solid cusp piece must be leveled on its flat surface till it is same thickness of pattern. This can be done by driving cusp side down into end wood, leaving out a little more than is sufficient to remove. The wood forms a grip, and may be filed.

The final stage is done with great ease and despatch, for, provided instructions have been followed closely, you will find that solid cusp piece will fit leveled edge of band, coming out flush and neat at the margins. You have only to place borax on edge of band and flat side of cusp piece, adjust with wire or place in soldering tweezers, and solder with very high grade stuff, say two carats down, using only a small quantity.

MODIFIED HOLLINGSWORTH CUSPS.

Pour into each depression of a die-plate type-metal, tin or Babbitt, file them down to the surface of the plate. These cusps are used as the Hollingsworth system. When the band is fitted for a crown, one of the cusps is selected to fit the articulation; from the corresponding depression in the die-plate, a gold cusp is struck and soldered to the band. These cusps may be made by imprinting crowns of teeth in Teague's compound and filling with metal.

TO MAKE WELL FORMED CUSPS.

DR. H. W. ALLWINE, OMAHA, NEB.

Dental Review, September.

To make sharp, well-formed cusps by the Hollingsworth system, make the counter-die as directed. Smoke this, place it into the rubber ring and pour upon it fusible metal, nearly cold. Scrape from the die about the thickness of the gold to be swaged. Anneal the gold, partly swage, anneal again and drive home.

If the Hollingsworth cusps be not at hand, select a tooth having the size and cusps wanted. Embed it in sand or any investment, exposing the cusps as desired. Place a ring about an inch in diameter, made of brass or any other metal, around this, and pour into the ring, over the cusps, some fusible metal. This will give a counter-die. Make the die as directed above.

The die may be made first by taking an impression of the cusps in plaster and pouring the metal, quite cool, upon this, when the plaster has become hard and dry. The metal should always be poured when it is just hot enough to flow.

GRINDING AND BACKING PORCELAIN FACINGS.

DR. C. C. ALLEN, TOPEKA, KAS.

Western Dental Journal, March.

The cause of the breaking of porcelain facings is found more often in the improper grinding and backing than in the heating and soldering of the piece. There seems little doubt that the two causes mentioned are responsible for nine out of ten of the broken facings which are revealed upon the removal of investment.

To properly grind a facing requires more time and care than any other one operation connected with the making of a crown, and it is very often given the least of both. Grind the porcelain from the very first toward the pins, as nearly as possible without grinding them, and never away from them, so as to avoid any small nicks being made in the finished edge of the tooth. In the final grinding be careful to leave the angle between the face of the tooth and the back full and sharp, not necessarily acute, though it sometimes is. Avoid a round edge. After using the finer stone, finish up with a cuttle-fish disk, being careful, as suggested before, not to round the edge, but simply to smooth it. Remove the superfluous material from the outer edge of the facing clear up to the pins, following a gentle curve, so that the back of the finished piece, if the pins were removed, would as nearly as possible represent a section of a globe. Avoid all humps and angles upon the back of the tooth.

Teeth should invariably be ground entirely over the back, so as to present an entirely new line of demarcation between the front and the back, and particular and especial attention should be given to the cutting edge. Never depend upon the strength of the facing for the strength of the crown, and this edge should be ground away until it is thin and sharp, almost like a knife edge.

For the backing, take a piece of pure gold, not platinum, of about 34-gauge, large enough to cover the whole back of the tooth. and punch for the pins in such a manner as to let the gold slip on and off easily. Anneal this gold, place it upon the tooth, take a burnisher, and begin gently to rub the gold to fit the tooth, beginning at the pins and working outward. Remove the gold and anneal frequently. On approaching the outer edge of the work, be very careful to rub the gold gently, so as not to nick the sharp regular edge. Work the backing down until it fits the back of the tooth. Then clip off the superfluous gold as close as may be, with scissors, and take a fine file and slowly file the gold down until the edge of the facing is reached. This part of the procedure is of great importance. Always file towards the edge of the facing, and let the file be held so that its surface will be on the same plane as the outside surface of the facing. This will give the gold an edge nearly square, as has the facing. Never file the gold so that there will be the least semblance of a knife edge. If properly reduced, the edge will always be at, or nearly at, right angles with the surface of the gold. After filing to the porcelain edge all around, if the backing is tight against the tooth, and there are no fins of gold overlapping the facing, the line between the gold and porcelain is as clear and smooth as the line between a properly inserted gold filling and the tooth. At this stage of the work, give backing temporary fastening to the facing by cutting a barb upon the side of the pins and bending it down against the gold, and proceed to place the work for the fire.

No matter how rapidly the work is heated, or how hot it may get, few teeth will be broken by this method, and it will produce a tooth whose backing approximates the porcelain so closely that it may be boiled in a solution of aniline without fear of discoloration, and the facings lost in the mouth will be reduced to a minimum.

RUBBER COTS FOR FINGERS.

DR. HENRY W. GILLETT, NEWPORT, R. I.

Written for The Compendium.

Use rubber cots on the thumb and first finger when polishing crown and bridge pieces. They protect the fingers and save a lot of scrubbing afterwards. One of these cots drawn over the first finger when making a filling requiring heavy pressure on the instrument, handled with the ball of that finger, will help to protect the sensitive finger tip from needless bruising. These cots cost but a few cents each at any rubber store.

PRESSING GUM AWAY FOR CROWNING.

DR. F. E. JUDSON, ANTIGO, WIS.

Ohio Dental Journal, July.

In preparing a tooth for the reception of a porcelain crown (Logan or Richmond), before excising the natural crown, take a piece of French rubber tubing, about one-eighth inch wide and a little smaller than the tooth to be crowned, carefully work it up on the neck of the tooth and as close to the gum as possible without causing too much pain, allowing the patient to wear it for forty-eight hours; the root can be faced off under the gum line without laceration, hemorrhage, or discomfort to the patient.

IMPRESSION AND BITE FOR BRIDGE, OBTAINED SIMULTANEOUSLY.

DR. L. C. LEROY, NEW YORK.

Items of Interest, November.

A clinic was given in which a substitute for impression cup—yellow beeswax (sheets) was used. The impression-cup being improvised of the desired shape and size from a sheet of wax, six inches long, a three-quarter inch strip was cut and united the edges, making a ring oval in shape divided midway, with a septum of wax, causing it to adhere to the ring with melted wax. This made a double impression-cup or plaster receptacle.

The plaster was prepared and the required quantity placed in one side of the wax receptacle and a similar quantity in the opposite side. The whole being placed in the mouth, the patient was requested to close the teeth, biting through the wax until the teeth antagonize as they would in repose; opening the mouth fractured the plaster. The parts were removed and subsequently inserted into the wax cup, pieces secured by melting the wax cup at places to hold together, varnished and placed in an articulator, both impression and bite being filled at once.

MATRIX FOR INLAY.

DR. CHAS. W. JENKINS, ZURICH, SWITZERLAND.

Written for The Compendium.

The writer has found the following to be a most accurate method for securing a mold for an inlay filling. Press No. 60 gold-foil into the cavity with a ball of spunk in the usual way. Withdraw the spunk and press in a bit of soft impression material. When it is sufficiently hard, trim with a very sharp blade to perfect contour, cutting away the foil at the margin. Withdraw the composition by attaching to it a bit of the same, hot, which will separate after removal, without altering the surface. A perfect model of the filling is obtained. The exposed surface can be covered with foil, lay the piece face downwards and pour the investing material upon it, or sink it in the same to the margin. In the first case, scrape away the top of the cement or asbestos, remove the foil that lined the bottom of the cavity, and after removal of the wax from the external contour of the inlay by melting the porcelain upon the foil. In the other case depend upon the action of the heat to shape the outer surface. Either method is good, but neither will succeed without the utmost nicety of attention and manipulation.

NATURAL ENAMEL INLAY.

DR. ARTHUR H. WALACE, SAN FRANCISCO.

Stomatological Gazette, May.

An inlay is applicable to four kinds of cavities: proximal cavity in the front teeth, with or without involvment of the cutting edge; in labial and buccal cavities. When the cutting edge is not involved, and inlay well fitted, will last a lifetime. When the cutting edge is involved the case becomes of a most serious character, and inlay depends wholly on the anchorage for its stability. In this event, make the inlay as large as possible, without cutting away too much of the tooth, and make a perceptible shoulder at the cervical boundary.

On the labial surface, when properly fitted, the inlay will last longer than gold. In a case where there is restoration of one half or one third of a tooth, he depends on one or two gold pins for anchorage, and the placing of a whole natural tooth-crown on the front teeth is very effective.

The advantages claimed for this are: first, the natural color assumed from three days to two weeks after the operation, the same as implanted teeth; second, the natural contour of the tooth restored; third, strength, non-friability; fourth, the artistic value when properly done.

The methods sometimes used to obtain these results are, rotation of the tooth with ligature (Younger's method) so as to bring the mesial surface to the front, spreading the teeth with cotton tape; and, if tooth is dead or discolored, bleaching to normal color with pyrozone.

In selecting a tooth to cut inlay from, care should be taken to get a tooth as near the size and shape of the one to be operated upon. This can be determined by the aid of calipers. After selecting the tooth, give it a bath of iodin to cleanse it and then let it remain in a solution of bichlorid of mercury (1 in 2000) for twelve hours. The modus operandi after this is to grind with fine stone to approximately the size, then mount it with shellac to an instrument so as to give access to cavity.

A perfect fit can be obtained by smearing the cavity with rouge and oil, and by placing the inlay in it, grinding away a little of the inlay at a time just where it comes in contact with enamel walls. After it is fitted wash out cavity with soap and warm water to remove oil, then thoroughly dry, and, using best cement, cement to place, care being taken not to displace inlay after it has begun to set. Trim off so as inlay will not strike antagonizing teeth, and you will have a filling that will last as long as gold, and will be a pleasure to yourself and your patient.

FITTING AND SETTING PORCELAIN INLAYS.

ELOF FORBERG, STOCKHOLM.

International Dental Journal, November.

Having excavated a labial cavity and finished the edges, take a piece of colored paper, or somewhat thick tin-foil, and hold this over the tooth surface with one hand, while with the other hand rub the paper with a polishing-steel, so that the edges of the cavity cut through the paper. In this way get a shape which perfectly shows the form of the cavity. This shape of paper or tin-foil is then stuck on, with varnish or something similar, to an artificial tooth, the color of which corresponds with that of the tooth to be fitted, when it should be observed that the curvature of the surface of the artificial tooth should be tolerably in accordance with that of the natural tooth; it is preferable, especially in case of a larger defect, to place the shape on that part of the artificial tooth which corresponds with the position of the defect of the natural tooth.

Going by the shape glued on to the tooth, it will be easy, by using cutting pliers and corundum or carborundum wheels, to form an inlay that will perfectly fit the cavity, and this can be done in the laboratory, so that all that remains to be done in the operating-room are the finishing touches, which must be from the cavity direct; before doing so the shape should naturally be removed, and the inlay fastened on a metal mandrel with gum-lac or a mixture of wax, rosin, and gutta-percha, which mixture is very suitable for sticking on pieces with (as well as for using as temporary fillings). When the piece has been accurately fitted, and everything has been made ready for the filling, the piece should be fastened in the cavity with Harvard cement. The cement, which should be well stirred and rather thin, is applied around the edges of the piece, which is then quickly pressed into the cavity, where it should be held with a steady pressure for some minutes to prevent its being displaced by compressed air or otherwise before the cement hardens. Only a thin layer of cement now separates the tooth from the porcelain inlay. The color of the cement should be a shade darker than that of the tooth. When How's crowns are used the piece should, of course, be fitted so that one or two of the platinum pins may be used as fastenings.

DOVETAIL PORCELAIN INLAY.

MR. F. B. HOWARD, ENGLAND.

Dental Record, October.

For porcelain inlays in anterior approximal cavities, the author of the following method seems almost to have solved the question. The illustrations, while a little rough, will almost show the method without description:

Such cavities as shown in Fig. 1 are cut to a dovetail as shown in Fig. 2, very slightly larger longitudinally over the labial than palatal surface.

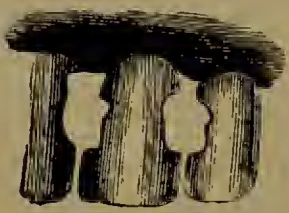


Fig. 1.

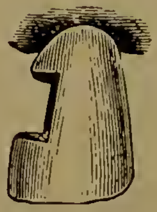


Fig. 2.

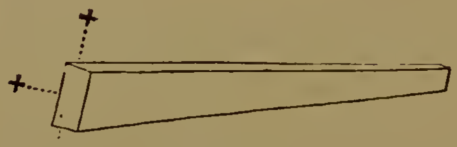


Fig. 3.

A porcelain piece, Fig. 3, is ground to accurately fit the groove. It is placed in position and marked on both labial and palatal sides and cut off to the approximate length. Cement is smeared in the cavity and the inlay wedge pressed into place. After the cement sets the inlay is trimmed and polished.

The writer says in cases where the decay has extended below the gum, he fills that part with gold and makes the dovetail shoulder in the gold, and proceeds with the inlay as usual.

Small, flat, square edge files are suited for cutting the cavity. Separating files, cut to a narrow width, are better for cutting the dovetail. If a stick of porcelain cannot be obtained, a facing may be used to excellent advantage.

INVESTING MATERIAL.

DR. GEO. EVANS, NEW YORK.

Ohio Dental Journal, January.

For single crowns or very small investments: 2 parts calcined marble dust and 1 of plaster. For large investments, including pieces of bridge-work: 1 part calcined marble dust, 1 part common white sand and 1 part plaster. The reason for the use of the latter proportions is, the sand prevents the excessive contraction that is liable to take place in large masses of investing material entirely composed of plaster and marble dust when subjected to great heat for considerable time.

The marble dust in combination with sand renders the material more suitable to fill interstices and inside of caps. In cases of bridge-work of any great size, a loop of iron wire should encircle the piece in the investment.

INVESTMENT FOR SOLDERING SMALL PIECES.

DR. A. P. JOHNSTON.

Southern Dental Journal.

Plaster and oxid of zinc, equal parts, make the best investment for soldering small pieces.

RUBBER JAW CONTOURING PLIERS.

DR. HENRY W. GILLETT, NEWPORT, R. I.

Written for The Compendium.

Slip a piece of small rubber tubing over the concave jaw of contouring pliers to prevent marring the gold while contouring a crown.

BANDING BADLY DECAYED ROOTS.

DR. W. H. TAGGART, CHICAGO.

Dental Review, February.

Briefly, Dr. Taggart's method consists, after first leveling down the root, in taking a piece of pink gutta-percha, and after slightly softening it, pressing it firmly upon the root. This gives an accurate impression of the outline of the root. This impression is then embedded in plaster, a smooth surface being left all around the imprint, and, on a level with it, a rubber tube $\frac{1}{2}$ or $\frac{5}{8}$ inch in diameter is then set over the impression, and the lowest fusing metal obtainable is fused and poured into the tube, and directly upon the gutta-percha impression. This gives a model of the outline of the root, on the end of a metal cylinder; the end of the cylinder is then carved down to the outline, and a perfect model of the root in metal is the result. Upon this model the band is fitted.

BOXES FOR BRIDGE TEETH.

DR. W. H. MARSHALL, ST. LOUIS.

Dental Cosmos, May.

While the writer's process is not entirely new, it possesses some original and practical points. Instead of backings soldered to the teeth, a box is made for each tooth, leaving exposed the buccal and morsal surfaces. Each tooth with its box is aligned and articulated on the model. The teeth are removed, the boxes and abutments are invested and soldered together. If the teeth are placed in the boxes before the bridge is fixed in the mouth, they are set with melted sulphur. If they are placed in position after the boxes with abutments are placed in the mouth, they are set with cement. This method avoids exposing the porcelain to the heat of soldering and enables easy repair if a tooth breaks.

USING RUBBER TEETH FOR BRIDGES.

DR. F. F. FLETCHER, ST. LOUIS.

Dental Review, February.

The method consists in filing the heads from the pins of the tooth, attaching the end of a strip of thin gold plate to the pins, drawing the strip tightly around the buccal surface, clipping out all of the plate on this surface except a narrow strip along the cervico-buccal margin, attaching the other end to the pins and soldering, thus forming a gold cap, the backing and cervico-buccal strip being continuous.

TO SOLDER PIN IN TUBE TEETH.

Ash's Quarterly, June.

When making a dowel-crown insert the thick or root end of the pin into a light copper tube which will hold it without carrying off too much heat; tin the end of the post, which is to enter the tube, apply zinc chlorid flux to tube and post, lodge the tooth on the point of the post, hold over a gas flame and drive the tooth home, being careful that the post takes its proper position which will be shown by the facet at its end properly fitting the surface of the tooth.

ORTHODONTIA.

CORRECTING FACIAL DEFORMITIES IN YOUNG SUBJECTS.

DR. C. S. CASE, CHICAGO.

Dental Review, October.

Attention is called to instances where the early extraction of the bicuspids, as soon as they can be reached with the forceps, is demanded.

We frequently see adult faces with abnormal protruding upper jaws and teeth, and with a bulged appearance about the lower portion of the nose. The teeth are commonly large, prominent and crowded, though not always labially inclined. The alveolar arch is necessarily prominent, but the deformity in the main is due to the large size of the superior maxillary proper, far out of proportion to the more delicately chiseled features which it supports and forces into unsymmetrical contours. The depressions in which the wings of the nose rest are more or less obliterated, as would be occasioned by the sting of a bee or an alveolar abscess. The nostrils are broad and open, and the end of the nose forced forward and up (retroussé) by the protrusion of the spinous process and cartilaginous septum. The upper lip being stretched over its inharmonious frame is shortened so as to cover the teeth with difficulty, and in action readily raises to an unpleasant exposure of the teeth and gums.

An extreme, though not uncommon condition, has been described. Every stage from this to perfect harmony characterizes the innumerable varieties of a certain type of physiognomies.

The important consideration for us is from an artistic and surgical standpoint. Has not nature been forced to produce this condition, wholly or in part, to accommodate teeth that were too large for the natural or inherent frame and overlying features? And can we have helped nature in the early years of development, by making it unnecessary for her to produce this excessive growth of bone for the development and sustenance of all these large teeth?

We certainly cannot reduce the size of the teeth, but we can reduce their number, and in so doing reduce the size of the destined maxillary and dental arches.

But we must make no mistake. The danger of advocating such a principle to students, and those who have given this branch of dentistry little thought, is that teeth will be extracted to accommodate an overcrowded condition in the arch, with little or no thought of the physiognomy. When in reality a careful and properly pursued study of the features and their comparison with parental types will show that the dento-maxillary arch should be enlarged and every tooth remain to induce its natural growth and development. If this is not attained by natural processes, every tooth should certainly remain to hold the artificially developed arch in place, as exemplified by the first case presented.

How are we to study the undeveloped face of a child, every lineament of which is passing through rapid changes of growth, with a view of determining whether or not the dental arch and jaws will be too prominent, or that other features will not enlarge to a harmonizing proportion?

A most wonderful provision of nature in dentition causes the full-sized crowns of teeth to erupt, as regards time, somewhat in proportion to the natural growth and enlargement of the jaws. And even when they do not erupt earlier than is common, or when their natural eruption is not interfered with by the premature extraction of the deciduous teeth, they are commonly obliged to take an irregular position or attitude at first, and await the growth of the jaw which permits them to become regular.

Never extract a permanent tooth for the purpose alone of correcting a dental irregularity, unless you know that the jaw has ceased growing, and never then unless you are convinced by a careful study of the position of the teeth—their relation and occlusion—that the dental arch should not be expanded, or by a study of the physiognomy, that the alveolo-dental arch should not be enlarged.

In a study of the relations of the teeth, the jaws and the physiognomy of a child, with the view of determining the advisability of extraction to correct or prevent the ultimate production of a facial deformity or marked imperfection of the features, it may become necessary for you to see both parents, and possibly other members of the family, to correctly determine the influences of inheritance.

In this comparison of temperament, physical frame, features and teeth, it may require no more than a glance to furnish you with all the data that will be of practical use. It would certainly be bad form to make an ostentatious display of the necessities of this proceeding, such as insisting that both parents come with the child that you may array, compare and note with pencil and paper, and with great pretense of knowledge and skill, the physical imperfections that have been propagated from one or the other, and that portend probable difficulties in the contemplated operation.

Such a course is neither in keeping with that modesty that ever characterizes true scientific methods, nor the common honesty of your profession.

When you have learned the routine of its requirements, this mental noting and comparing of data that may be useful to you requires no more special skill than many other things in dentistry.

Usually only one parent comes with the little patient, and here you may find all that you require. If not, it will not be difficult to see and converse with other members of the family.

If there is a marked difference in the parents it may not be difficult to determine from which one the child has inherited the teeth, by the peculiar shape and size of the incisors alone. But in regard to the maxillæ in an undeveloped condition there will be more difficulty, though it will be well to remember that the deciduous teeth are rarely irregular or disproportionate in size to the frame and facial features. If, therefore, there is a more than natural difference in the size of the permanent and deciduous teeth it will indicate an inherent union of inharmonious types.

In this connection it must not be forgotten that the crowns of the permanent incisors are almost invariably far too large for their undeveloped surroundings. Mothers are frequently horrified and for some time lament the apparent abnormality in the size of the superior centrals.

If the occlusions of the incisor teeth are far from a normal type in their anterior relations, and the same condition exists with either parent, you may reasonably expect that you have before you the adult type of what the child will become if unaided by your skill; and especially if you find by comparison that there is a similarity in other particulars.

With differences in temperament, compare general shape and size of the eyes, brows, ears and teeth.

Other features are so subject to change in the processes of natural growth and development they cannot be relied upon to furnish legitimate data. For instance, I have seenthe nose change in a few years of late youthful development from one that was small and short, and over the nasal bones decidedly depressed, to one that was diametrically different in every particular.

When you do not find in either parent the same symmetrical relations that promise to prevail in the child, see if the cause is not from a union of the large teeth of one parent with the small jaws of the other.

As said before, if the teeth of the parents are decidedly dissimilar in size, you may be able to determine with certainty to which parent the teeth of the child are due, and if the teeth and jaws of the other parent are small, and other features are similar to those of the child, you will be confirmed in your conclusion of the admixture of undiluted types.

All these things which have taken so long to describe, and which may often be determined at a glance, are of the utmost importance in determining the propriety of extracting certain teeth to reduce an apparent abnormal protrusion which may in time become symmetrical in its relation, by the natural growth of the jaws and other features; and on the other hand the equally culpable error of saving teeth, or the failure to extract teeth, whose very presence in the arch obliges nature to reproduce a parental deformity, or produce an acquired deformity, by an effort to sustain the large teeth of one parent in conjunction with the small jaws of the other.

For a child with an abnormal superior protrusion, and with teeth prominent and crowded in an arch whose shape does not admit of correcting by a lateral expansion, extract the first bicuspids as early as possible, and even before they have completed their eruption, together with the deciduous cuspids; unless it be one of those very rare instances where the first permanent molars cannot be saved.

The same is true of the lower, when there is reason to believe there will be a disproportionate over-development of the lower dental arch.

In the ordinary course of eruption the development and eruption of the permanent cuspids are doubtless more influential than other teeth in emphasizing an anterior protrusion of the central features of the physiognomy. In the course of their eruption they are obliged to crowd into alignment along the mesial surfaces of the roots and crowns of the first bicuspids—which at this time represent the immovable bases of the arch—with the result that the incisive and intermaxillary portion of the arch is forced forward to a more pronounced position. This movement has been shown to be not impossible or difficult of attainment even much later in life.

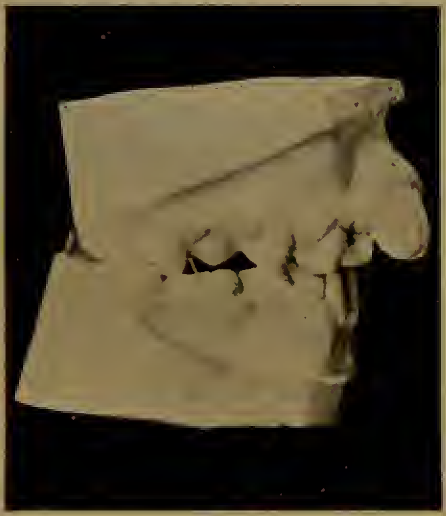


Fig. 1.

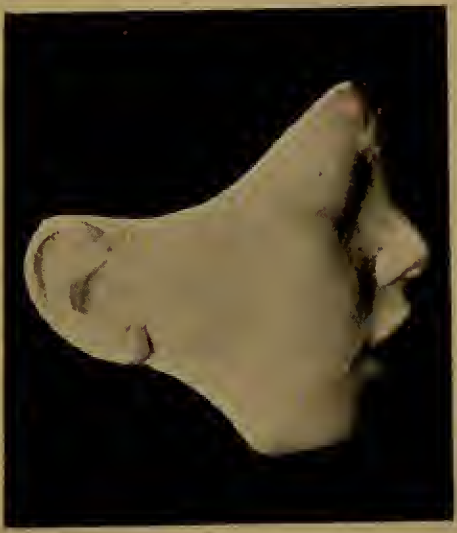


Fig. 2.

With the first bicuspids and deciduous cuspids removed sufficiently early, there are numberless instances where the arch, anterior to the second bicuspids, would be diminished the width of a bicuspid, without resort to artificial means.

By the exertion of a slight traction force from an occipital base of anchorage, the sockets of the temporary cuspids will be closed by the permanent laterals, and the permanent cuspids in the course of their eruption will be deflected into the alveoli of the extracted bicuspids.

Figs. 1 and 2 represent one of many cases treated in this way, though not all by the occipital method.

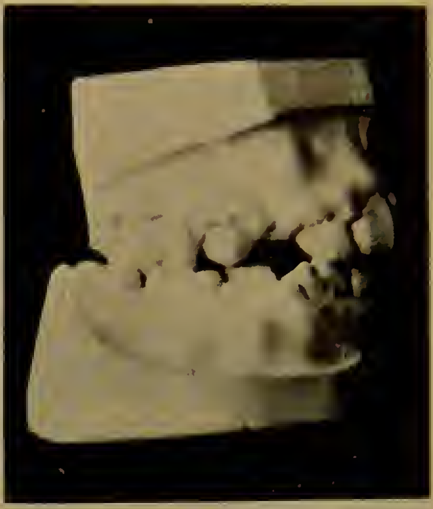


FIG. 3.

Fig. 3 shows position of teeth after about two months of traction force from molar anchorages. The protrusion was not so pronounced but that I could obtain sufficient retraction of the arch by this method, and especially because I gained something by its lateral expansion.

The patient, nine years of age, was brought to me by his father. His mother I did not see till after the commencement of treatment. But I believed this to be unnecessary, because I found that the boy had the teeth, eyes, ears and general temperament of the father, whose upper arch was abnormally protruded in a similar manner. In fact, one of the reasons the father gave for bringing him thus early, was that he did not want him to grow up with teeth like his.

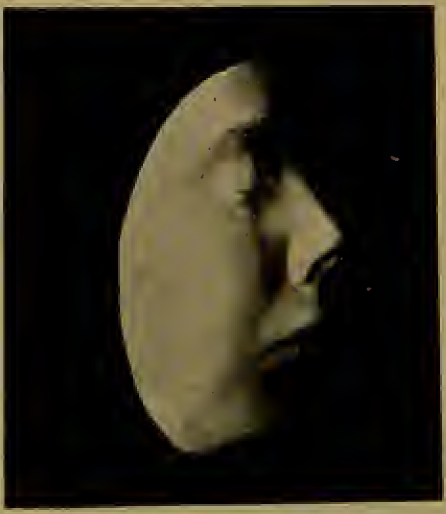


FIG. 4.

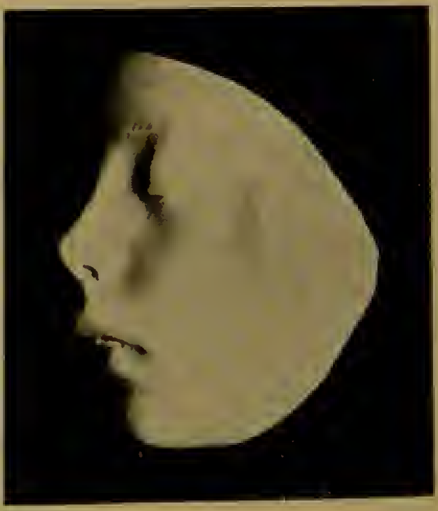


FIG. 5.

Had I found the father's teeth in proper relative and symmetrical position, and in other particulars that can be legitimately used as data, similar to those of the son's, it would have been an argument in favor of non-extraction, with the expectation of other treatment later; but it should not have been passed without seeing the mother. Had the mother's teeth been found small, and the general physical features cast in a more delicate mould than her husband's, I should have pursued my investigations along other lines that require a closer discrimination, with the view of determining if the child had not the large teeth of the father and small jaws of the mother; in which case extraction would also have been indicated.

Face models 4 and 5 are types of this character of facial deformity which are being treated.

EXTRACTION AS RELATED TO ORTHODONTIA.

DR. C. L. GODDARD, SAN FRANCISCO.

Stomatological Gazette, April.

As the assertion is sometimes made that it is never necessary to extract a tooth in order to correct an irregularity, it will be well for us to inquire for a few minutes into the causes of certain irregularities.

Attention is directed to two classes only: first, superior protrusion, sometimes accompanied by a V-shaped or pointed arch; and, second, prominent cuspids with depressed laterals.

The origin of both of these irregularities may be the same—that is, a small jaw inherited from one parent, or other ancestor, and large teeth from the other. In this case, starting from the first permanent molars as fixed abutments of the arch, if the teeth anterior to these arrange themselves in a normal line as regards each other, they will form an arch larger than that section of the jaw which supports them, and the alveolar process growing around them will conform to their position, forming thus a case of superior protrusion.

If the teeth anterior to the first permanent molars do not arrange themselves in a normal line as regards each other, the incisors may erupt in normal positions, as also the bicuspids, thus taking up all or nearly all the room, so that the cuspids erupt outside of the arch, and in doing so depress the laterals.

Another cause may produce the same result, even when the teeth are of the normal size for the jaw, namely: premature extraction of the second deciduous molars. When this occurs the first permanent molars crowd forward. Will remark, in passing, that for some unexplained cause the posterior teeth tend to move forward when there is room for them to do so.

If, then, the second deciduous molars have been extracted prematurely, and the first permanent molars have moved forward so as to occupy part of the space belonging to the second bicuspid, not enough space will be left in the arch forward of that point for the teeth which are to occupy it, and the result will be too small an arch for normal teeth. While in the first case mentioned the teeth were too large for the jaw, the effect will be the same. The first permanent molars standing as firm abutments, often reinforced by this time by the second permanent molars, the teeth anterior to them must erupt so as to form too large an arch, producing either superior protrusion or V-shaped arch, or must crowd the cuspids out of line.

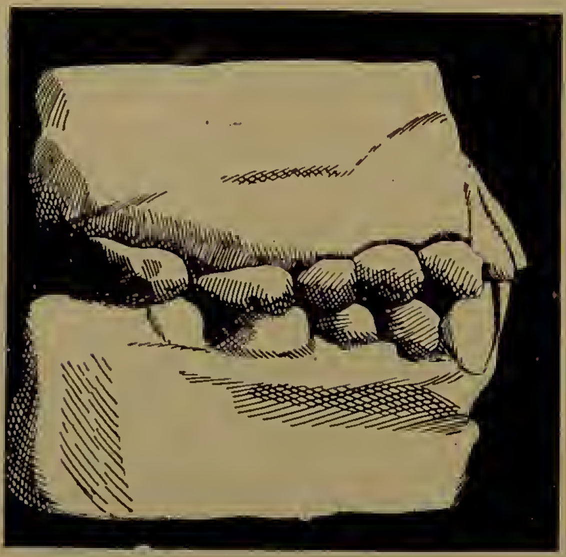


Fig. 1.—Before.

First bicuspids, superior and inferior, extracted.

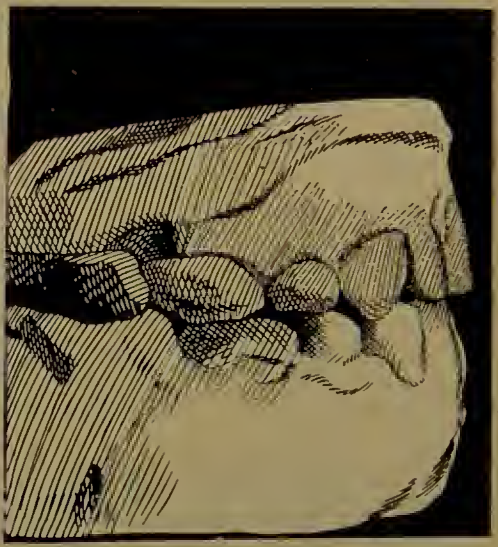


Fig. 2.—After.

Anterior teeth drawn back.

Superior protrusion, V-shaped arch and "prominent cuspids with depressed laterals" may also be due to other causes, such as thumbsucking, lack of development of the intermaxillary bone, etc.; but we will consider now only the two causes mentioned.

In the case of superior protrusion the anterior teeth must be moved back, and in the other case the cuspids must be moved backward and the laterals forward. In either case, owing to the causes mentioned, it is necessary to make room; and, in my opinion, the only way to make room is by extraction of one of the bicuspids or of a first permanent molar on each side, preferably the first bicuspid, unless one of the other teeth is very defective from caries. If all the room thus gained is needed, an appliance may be used which will move back the anterior teeth in the first case (or the cuspids only in the second case) without disturbing the teeth posterior to the space.

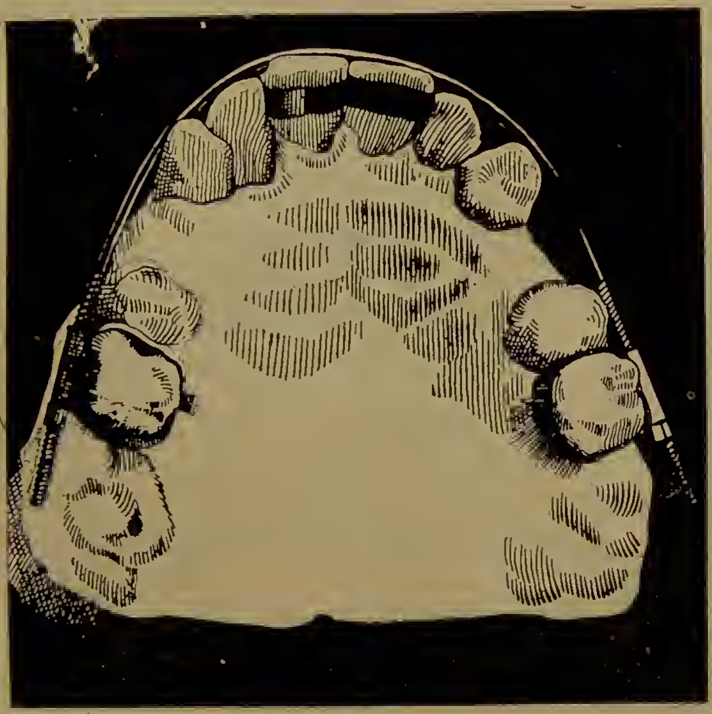


FIG. 3.

Day appliance used in case Figs 1 and 2. Similar appliance on lower arch.

In case only part of the space is needed, an appliance may be used which will move the back teeth forward, while it also moves the front teeth backward, and thus fill up all the space.

Figure 1 shows a case of protrusion of both superior and inferior teeth, due to the teeth being too large for the arch. The four first bicuspids were extracted, the appliance shown in Fig. 3 attached to the superior teeth, and a similar one to the lower. At night a cap and bit, as shown in Fig. 4, was worn. The nuts at the ends of the bows were turned every morning to take up the room gained by the cap during the night. Fig. 2 shows the result. The anterior teeth have moved back and the posterior teeth forward till the spaces are completely obliterated.

As the second class of cases, "prominent cuspids and depressed laterals," and, also, the pointed or V-shaped arch, may be also due to other causes, let us consider the subject further.

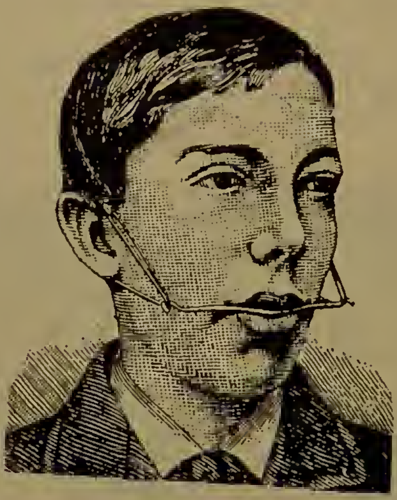


Fig. 4.

PROMINENT CUSPIDS AND DEPRESSED LATERALS.

Etiology.—This common (form of) irregularity may be (a) constitutional, due to lack of development of the inter-maxillary bone; (b) inherited, large teeth and small jaws; (c) acquired, from premature extraction of the deciduous cuspids; (d) from premature extraction of second deciduous molar and crowding forward of first permanent molar, leaving less than the normal room for bicuspids and cuspids.

Treatment.—To make room for proper arrangement of the teeth in this class, it is generally necessary to expand the arch or to extract one or more teeth.

Unless the arch will admit of expansion to advantage, extraction is better.

If expansion should make the arch too large, or the anterior too prominent, extract.

If the superior maxilla itself is so narrow that expansion would make the bicuspids and molars slant outwards too much, extract. If caries are prevalent, extract.

IN FAVOR OF EXPANSION.

The full number of teeth are retained, the pain of extraction is obviated, and a narrow arch is widened and made to correspond with the other features.

IN FAVOR OF EXTRACTION.

Room is gained more easily; the treatment is simplified, as there are fewer teeth to be moved; the teeth are retained in their new position more easily, because, if no teeth are extracted, the same cause that produced the irregularity tends to reproduce it, while if room is made by extraction the action of the lips and tongue tend to move the teeth into the normal arch. With expansion nature work against us. After extraction nature works with us. In many cases no other treatment than extraction is necessary.

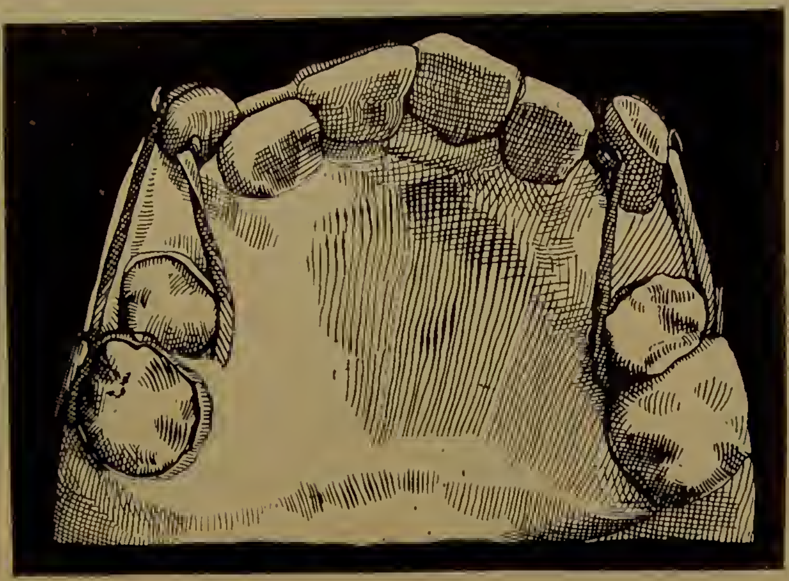


FIG. 5.

Appliance for retracting cuspids. Left cuspid to be moved but little, so first bicuspid is drawn forward at same time to fill space. Reciprocal movement.

Having decided upon extraction in any case under consideration, the choice lies between a lateral incisor and some tooth posterior to the cuspid. The cuspid should never be extracted, as, on account of its long root and prominent position, its loss causes a depression of the corners of the lip and wing of the nose that can never be remedied.

The choice between a lateral incisor and some tooth posterior to the cuspid depends on the position of the apex of the root of the cuspid, and also of the lateral.

If the apex of the root of the cuspid is so situated that the crown slants away from the median line, or will do so after being moved into its normal position, the extraction of one or both laterals is admissible.

If a lateral is unusually far back of the normal line and the apex of the root also, when the tooth is moved forward till the cutting edge is in line with the centrals, the neck of the tooth will be back of its proper position—that is, the tooth will have an unnatural slant forward. This is not of as much importance as the position of the apices of the roots of the cuspids, for the roots may be moved forward by Case's method, but should be taken into consideration in connection with the other.

In very rare cases a central incisor may be extracted to gain room—that is, if very badly decayed; if an incurable abscess exists, or if the root only remains and cannot be crowned to advantage.

In the lower arch an incisor may be extracted to advantage in many cases, as the four are so nearly alike in appearance that the absence of one is not noticed.

If, in a given case, it seems best to extract some tooth posterior to the cuspid, the choice will lie between a bicuspid and the first molar.

If the bicuspids and first molar are equally sound, extract the first bicuspid. This will leave two teeth for anchorage in retracting a cuspid; or, if the second molar is erupted far enough, three teeth may be utilized. Very secure anchorage is necessary, for the cuspid is the most difficult tooth to move, and oftentimes the two anchor teeth will move faster than the cuspid.

In some cases the cuspid needs to be moved back but little, then the second bicuspid only need be used for anchorage and the two teeth moved toward each other to fill up the space (Fig. 5, left side). The molar will follow, owing to the tendency of the posterior teeth to move forward.

If, however, the second bicuspid or first molar is so defective as not to be easily preserved by filling, the defective tooth should be extracted. This, however, will complicate the case, as more teeth are left to be moved, and fewer for anchorage.

Fig. 5 shows the writer's modification of Prof. Guilford's appliance for retracting the cuspids. On each cuspid is cemented a band with a hook on each side. On each second bicuspid or first molar is cemented a band with a tube on each side. The posterior end of the tube is filed so as to serve as a hook.

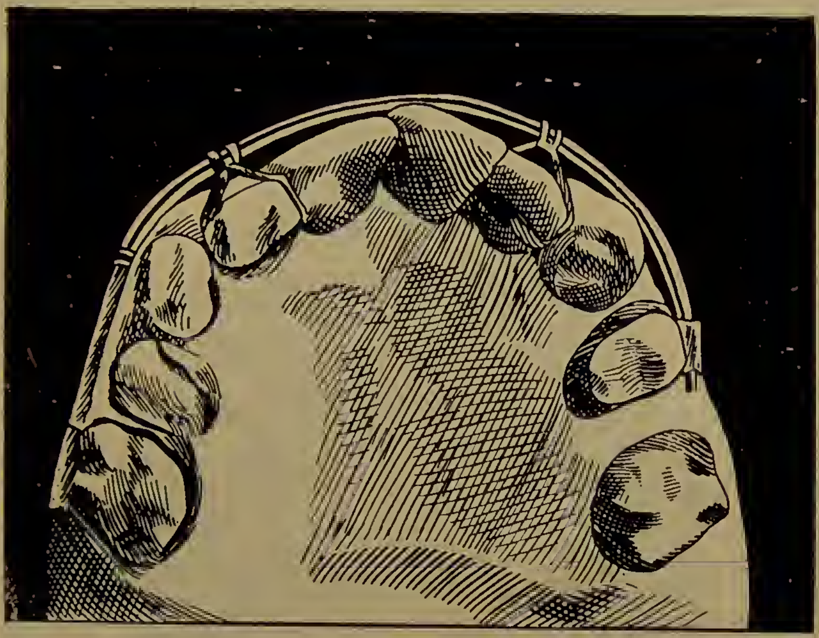


Fig. 6.

Appliance for moving laterals forward.

If the bands are fitted to both bicuspid and molar, and soldered together, the anchorage is increased and the tendency of the teeth to tip forward is lessened (Fig. 5, right side).

A rubber band stretched from one hook to the other on both buccal and lingual surfaces gives the power, and the cuspid moves back. After the cuspid is moved in position it can be retained by substituting fine platinum or silver suture wire for the rubber bands. The buccal tubes may be utilized for inserting the ends of a wire bow which passes in front of the incisors (Fig. 6). Rubber bands from this bow will draw the lateral incisors forward. An inner bow can be placed in the lingual tubes and utilized for drawing central incisors backward, or rotating them, as is often necessary in such cases.

If either cuspid needs rotating, a rubber band will be needed on one side of the tooth only, and the hook may be so placed on the band that the tooth will be rotated as it is drawn back.

Prof. Angle advises the use of the drag-screw for retracting cuspids. By soldering a long tube to two bands which are cemented to two teeth, and extending the drag-screw through this tube he reduces to a minimum the possibility of the teeth tilting. This appliance is very effective. The position in which the hook is attached to the cuspid band will depend on whether it should be rotated or not in retraction. (See Fig. 7.)

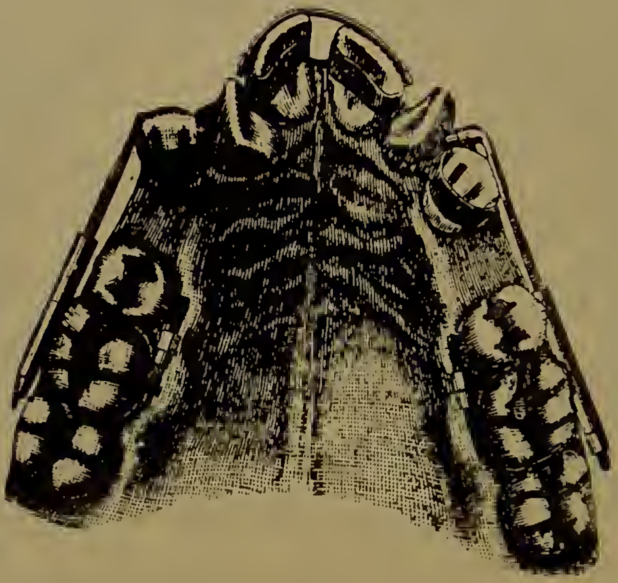


Fig. 7.

Angle's drag- screws. Backward movement and rotation.

After the cuspids are moved to their new position the same appliance may remain as a retainer. It will be found that a cuspid moved into its proper place, when room has been made by extraction, will need less retention than any other tooth.

Greater anchorage can be obtained by a plate, for it impinges upon the anterior alveolar ridge and incisor teeth as well as upon the posterior teeth. Its use is especially advantageous when a second bicuspid or first molar has been extracted, for then one or two teeth must be moved before the cuspid. A wire or clasp should encircle the posterior tooth for greater anchorage.

When room has been gained by extraction, as indicated in these cases, it is not necessary to wear a retaining appliance for as long a time as when room has been gained otherwise.

Retaining appliances should be of such construction that they may be cemented to the teeth, and connecting parts should be of such slender construction that the teeth can easily be kept clean. In many cases the same appliance that was used for regulating may be used for retention. If a screw has been used, the nut may be cemented in a fixed position. If piano wire has been used, non-elastic wire may be substituted. If ligatures or rubber bands have been used, they may in many cases be replaced by suture wire of silver, platinum or gold.

As was hinted in one part of this paper, expansion of the arch may be best in some cases of V-shaped arch, and also in some cases of prominent cuspids and depressed laterals.

IRREGULARITIES AND THEIR SURGICAL CORRECTION.

DR. EUGENE S. TALBOT, CHICAGO.

Dental Cosmos, November.

Those with experience in the correction of the irregularities of the teeth realize how difficult, tedious and painful such operations are. Especially is this the case if the patient be advanced in years. Indeed, such operations are often not attempted, because of the density of bone. This is the case especially in hypertrophy of the alveolar process. The inconvenience and unsightly appearance of many appliances required, when great pressure is needed to move certain teeth (notably cuspids, upper and lower) either forward or back, is another objection. Appliances adjusted to the head are so unsightly and embarrassing that not infrequently the patient is deterred from the operation which would otherwise have been undertaken could some method be adopted which would not detract from personal appearance.

The method of attachment of appliances to the molars for the purpose of moving the cuspids and incisors back frequently chagrins and mortifies the operator when he discovers that, instead of the molars being the fixed point and the cuspids drawn back, the reverse has occurred.

One most difficult problem to solve, which always requires extra pressure, is that when the inferior anterior alveolar process has become excessively developed, carrying the incisors upward until the cutting-edges come in contact with the mucous membrane in the vault of the mouth, which causes proliferation of osteoblasts that carries superior incisors forward.

Density of bone often makes it very difficult to obtain sufficient force to produce the absorption of this tissue required to bring the teeth back into place. Probably one of the most difficult operations is to carry a cuspid, which is erupting in the vault of the mouth, back into its normal position. This not only requires considerable force, but time, to say nothing of the difficulty in attaching a cap for a point of resistance. Rotation of the teeth, especially the incisors and cuspids, is frequently difficult, if not impossible, owing to insufficient leverage.

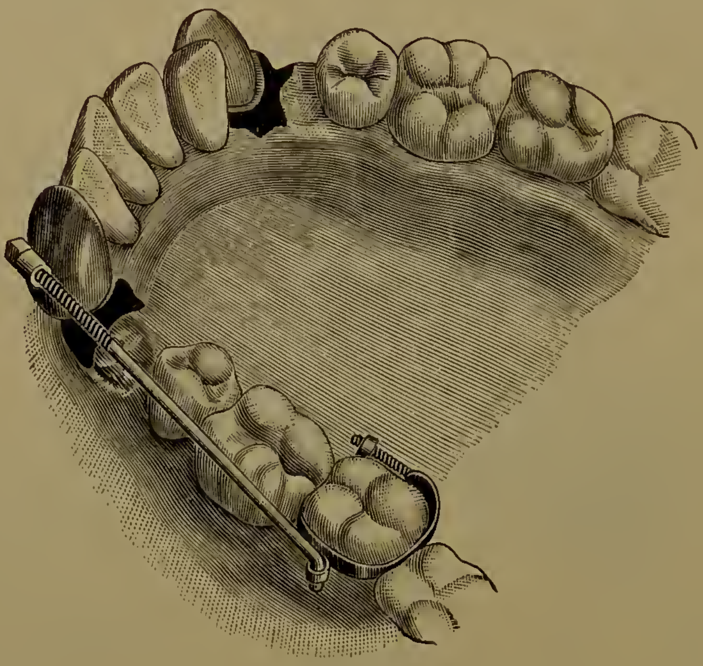


Fig. 1.

Many other situations present themselves to the operator in his practice other than those mentioned, but as all require treatment in the same manner, only the most difficult cases have been cited. After an appliance has been adjusted, no matter of what nature, and pressure applied, the long, tedious method of plowing through the alveolar process (regardless of the density of bone) by absorption is pernicious and unscientific, not to speak of the long, tedious days, weeks, and months of suffering. The period of life most acceptable for the correction of these deformities is between twelve and sixteen years. This time is to the patient the most critical in their lives, and as in every case they are degenerates with an unstable nervous system, the greatest care should be taken not to subject them to great strain.

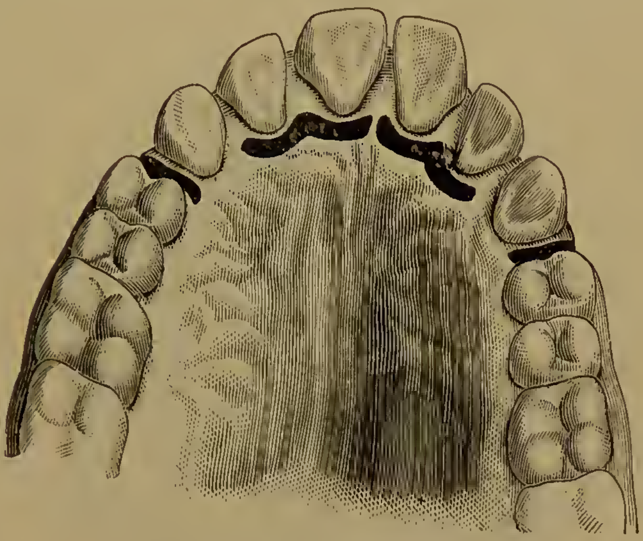


FIG. 2.

The writer has met with such uniform success that he does not hesitate to recommend it to all practitioners as perfectly safe and reliable with the antiseptic care required in surgical operations.

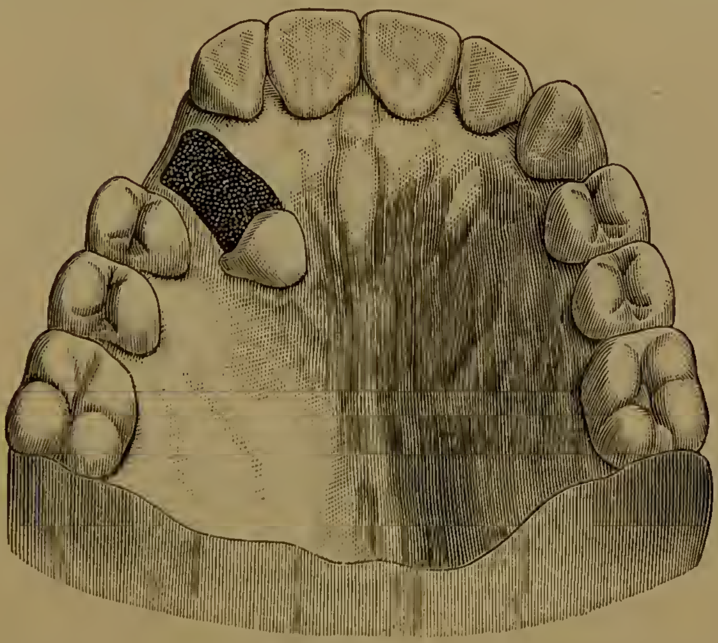


FIG. 3.

This method consists in removing entirely the alveolar process in the line of travel of the tooth to be moved, leaving a small amount of process about the root of the tooth, holding intact the peridental membrane. This is accomplished with coarse-cut burs, or those that will cut in all directions. They can thus be used as drills in certain conditions to be mentioned later on.

If the cuspids require to be carried backward, make an appliance with bands about the first and second molars, with cap upon the cuspids and a bar with screw and nut upon the end, as recommended by Dr. Farrar. Extract the first bicuspid, and adjust the appliance with a sharp new bur dipped in five per cent. carbolic acid or one per cent. corrosive sublimate or listerine. Then resting the hand against the cuspid, cut out the palatine and buccal V-shaped plate, making a concave surface of the alveolar process, as illustrated in Fig. 1.

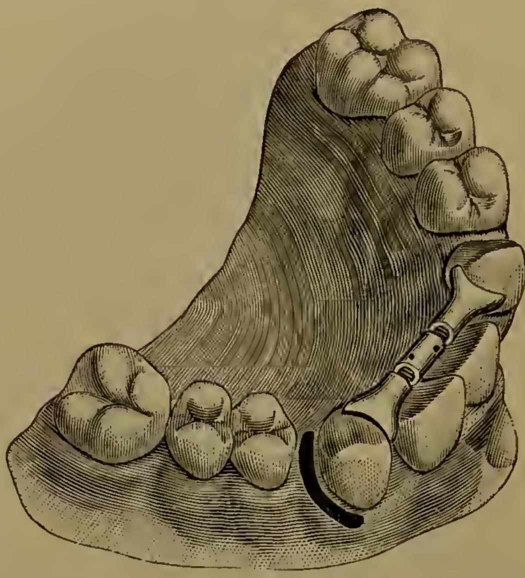


FIG. 4.

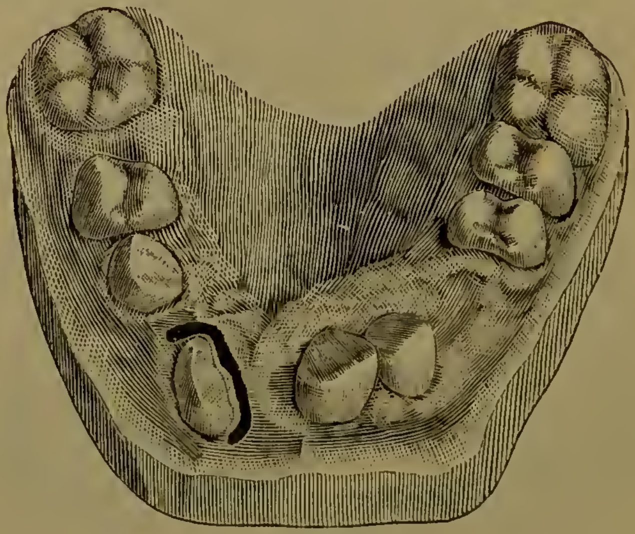


FIG. 5.

If the superior incisors are to be carried back, cut semi-circular spaces just posterior to the teeth to be moved—(Fig. 2). To carry a cuspid into place which is erupting into the vault of the mouth, remove the alveolar process in the direction of the line of travel—(Fig. 3).

In moving teeth laterally by a jack-screw, it will be found that not infrequently one tooth moves faster than the other. To bring both to their proper position, cut out the alveolar process on the side of the slowest moving tooth, and both will come into proper position—(Fig. 4). To rotate a tooth, cut a circular groove as deep as possible around the tooth, leaving enough process to hold the peridental membrane intact—(Fig. 5). In this manner teeth may be moved very rapidly and without much pain. This should always be done by means of screws. By this method we have the tooth or teeth to be moved completely under control. Any of the teeth in the mouth may be used for the fixed point of resistance, thus doing away with all unsightly appliances outside the mouth. When in place, they should be anchored in the usual manner. Antiseptic washes should be used from time to time, such as one per cent. corrosive sublimate, listerine, or five per cent. carbolic acid.

In operations of this nature the peridental membrane and also the periosteum are apt to be injured. This was the particular question in recommending it to the profession. Although he had a few cases of infection, he is quite certain now that such injuries are not of any serious consequence, since with proper precaution no bad results will follow. With this mode of treatment, patients are saved time and money, and the operator worry.

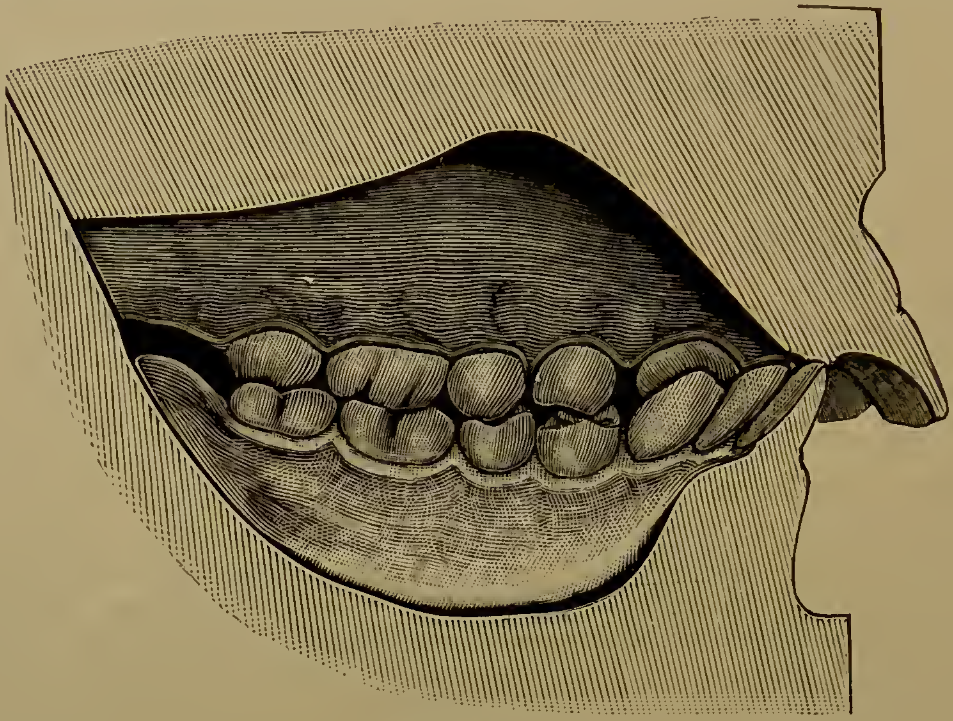
LIFTING LOWER TEETH AND RETRACTING FRONT TEETH.

DR. W. S. DAVENPORT, PARIS.

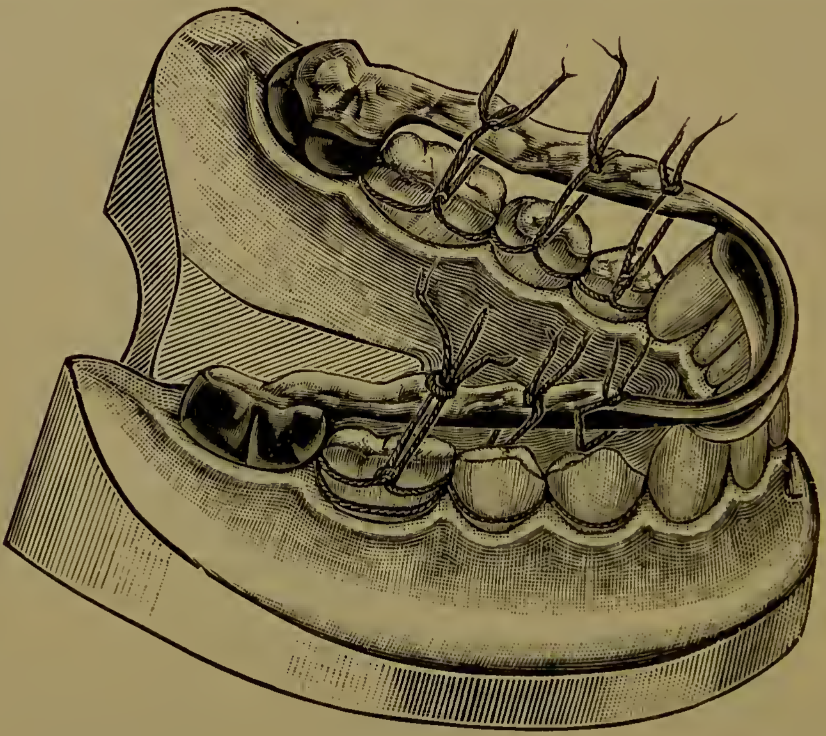
Dental Review, February.

Model 1 represents the mouth of a Spanish lady, seventeen years of age. The articulation of the bicuspids and molars is normal.

The lower arch is very much curved downward with the incisors biting into the gums above. The facial expression was very unpleasant, as the protruding teeth caused an upward roll of the lip. The patient was the only sufferer from this cause in her family, and she had none of the habits to which similar cases are attributed. The first means employed toward correcting the irregularity was to insert a bridge appliance, which was fastened by the



Model 1.

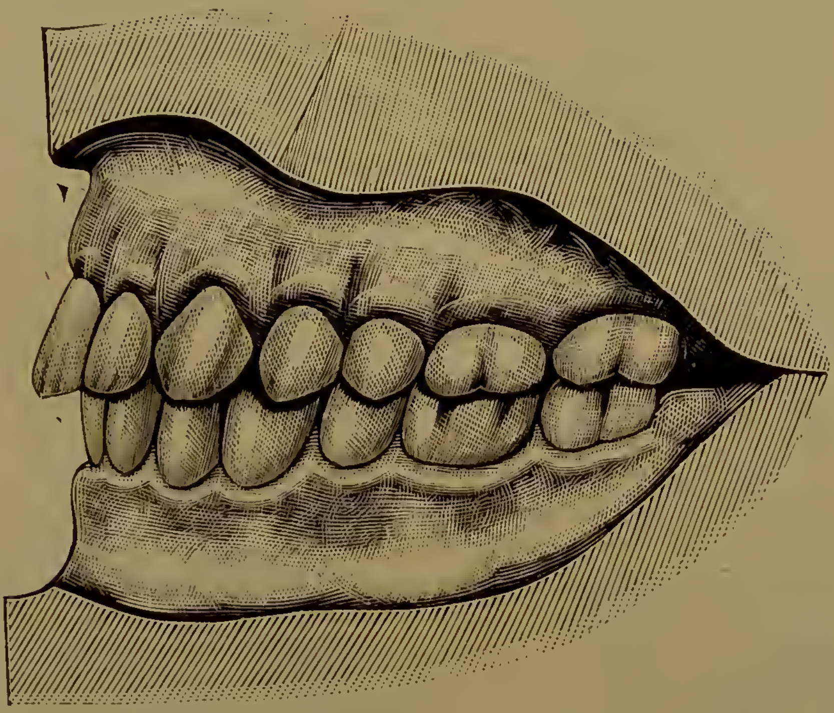


Model 2.

use of gold caps to the two second molars and brought forward a few lines above the molars and bicuspids, resting with a gold saddle on the six front teeth.

In two weeks the arch was spread and the teeth were drawn up to a normal position by the use of ligatures which were looped around the bicuspids and molars and fastened at the lingual surface, then tied to the masticating surface of the bridge above. (See Model 2 with bridge in place.)

The ligatures were removed in about one week. The teeth remained firmly in this position, and the patient ate on the bridge for three months; then removed the bridge, spread the upper arch and there was ample space to draw the protruding teeth to their position. (See Model 3.) This was accomplished by the force obtained of twisting wires as described in the International Dental Journal, and in 1893 Catching's Compendium.



Model 3.

PLATE SCREWS.

International Dental Journal.

Dr. J. K. Wiley uses what are called plate screws for regulating purposes. They are steel screws and can be obtained of any watch factory or jeweler.

SIEGFRIED'S REGULATING SPRING.

R. RUNSCHENBACH, DRESDEN, GERMANY.

Dental Cosmos, June.

Many very complicated pieces of mechanism have, from time to time, been devised to correct dental irregularities, and used with varying success; surely this multiplicity of apparatus is an evidence that they all have deficiencies which hinder their general application in regulating practice.

We wish to call attention to a new and very simple appliance which has been in use for a number of years, and the result in every case where this method has been tried has been most satisfactory.

Siegfried's regulating spring is well known. Any practitioner can use it with facility and without putting the patient to special inconvenience, for which reason we commend Siegfried's new method of affixing his regulating spring to the consideration of the profession.

The following illustrations afford examples of the new method of moving teeth for regulating purposes, aud no one who has made a careful study of regulating can fail to see the advantage of the extreme simplicity in all appliances here figured.

Fig. 1.

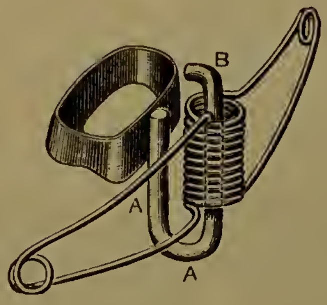
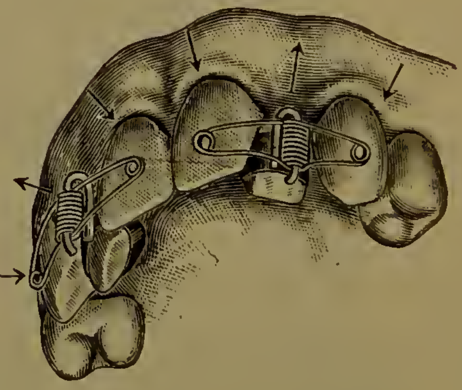


Fig. 2.



TO DRAW RECEDING TEETH INTO POSITION.

A nicely made band is fitted to the irregular tooth. This done, a piece of wire is cut and soldered to the band, with the end of it bent up so as to form a hook; see Fig. 1, a. The prepared band is now firmly cemented to the tooth. After this, separate the two wings of the spring, slip the spiral on the hook b, and finally the end of it is bent over, so the spring is prevented from slipping off.

Fig. 3.

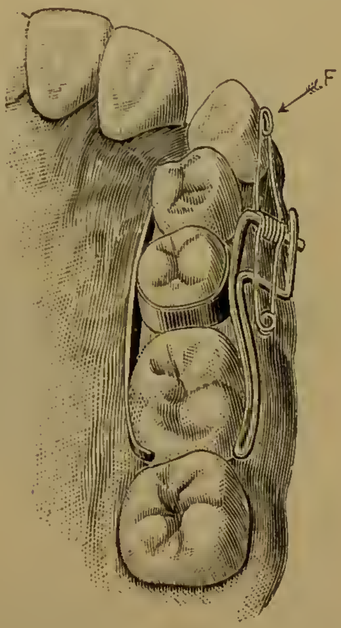
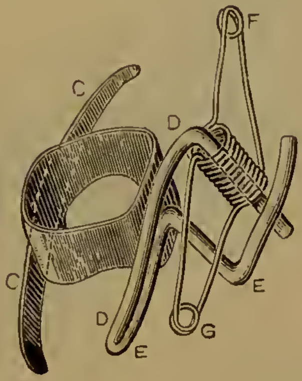


Fig. 4.



The action of the spiral and of the wings is shown by the arrows in Fig. 2.

RETRACTION OF A TOOTH.

As will be seen on referring to Fig. 3, this is a case where a forward growing cuspid is to be pressed backward. Here we have as a driving force only one wing of the spring. See Fig. 3 and Fig 4, f.

The band is fitted to the second bicuspid, and as shown in Fig 4, c c, a piece of half-round wire is soldered to the band on the lingual surface, starting from the first molar and ending at the first bicuspid. By this arrangement the spring is supported by three teeth. On the labial surface two wires, bent at right angles, are soldered—Fig. 4, d e.

Thus prepared, the apparatus is cemented to the second bicuspid. The spring is then placed on the bent end of the wire d, and the end of the wire e is bent over again to firmly hold the spring. The wing f of the spring exerts its power against the cuspid and operates in the direction of the arrow, as shown in Fig. 3.

TO ROTATE ONE TOOTH IN ITS ALVEOLUS.

In this case (Fig. 5) we use both wings of the spring as a driving force. This apparatus has much likeness to that just described, as it also consists of a band with a support soldered on the labial surface—Fig. 6, g g. The hook h, soldered on the lingual surface, serves for putting the spring into use.

Fig. 5.

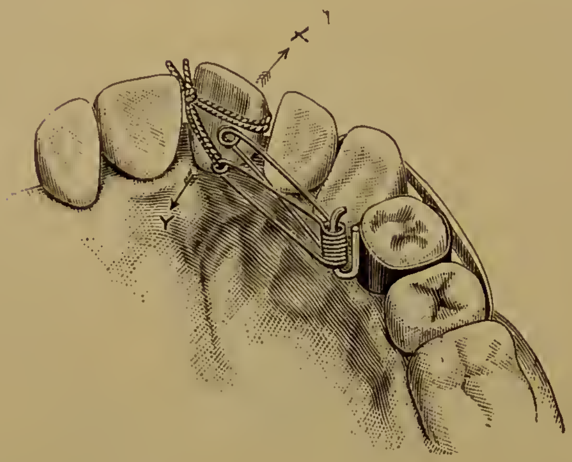
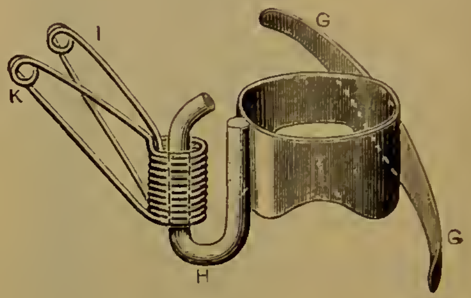
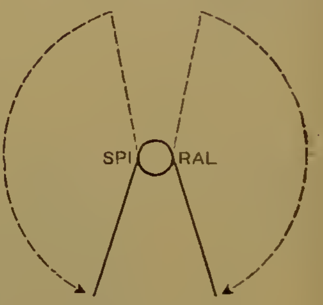


Fig. 6.



After this device is fastened with cement on the first bicuspid, we at first turn the wings of the spring over one hundred and eighty degrees—(Fig. 7). Now we put the spiral on the hook h, so the wing i will press on the distal side of the tooth to be regulated, and operate in the direction of the arrow x—Fig. 5.

Fig. 7.



A silk ligature is now attached to the tooth, and the knot made on the labial surface. One end of the string is drawn through the eye of the wing k and fastened with the other end of the string to another knot, and the wing k will draw the tooth in the direction of the arrow y—Fig. 5. In this way the tooth is turned with perfect equality of action by both wings of the spring.

TO TURN TWO TEETH AT THE SAME TIME.

Among the many forms of dental irregularities the following cut, Fig. 8, represents one which is very common; the central incisors being situated more or less at right angles to the line of the arch. Both teeth are encircled by a well-fitting band. A hook is soldered on a little back of the space between the central and lateral incisors—Fig. 9, l m.

Fig. 8.

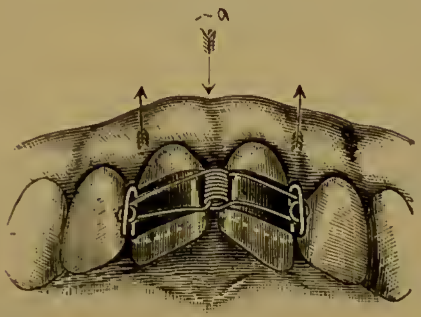
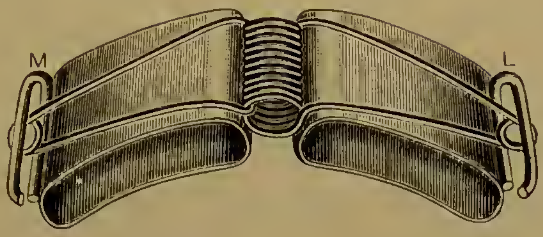


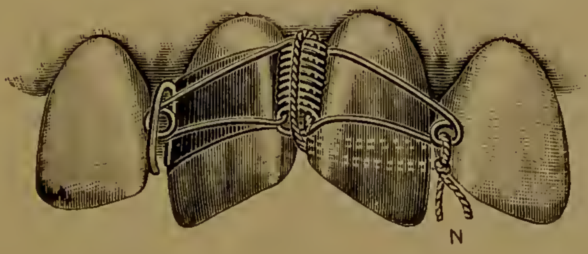
Fig. 9.



Now the bands are fastened with cement, and we only have to put the regulating spring into use—(see Figs. 8, 9). The wire ends of l and m, Fig. 9, are to be turned over again. The arrows in Fig. 8 show the action of the spring.

If there should not be enough space for two bands, fix one with a hook as usual, and for the other use a silk ligature, as shown in Fig. 10. We pass the string through the spiral, bring up both ends across the lingual surface to the eye of the wing n, Fig. 10, and fasten there by a knot. The result is exactly the same as before.

Fig. 10.



The teeth regulated as described above can be easily retained in place until they have become firm in their new positions by using the band already fitted to the tooth to be regulated, and soldering a piece of wire on the lingual or labial surface, as the case may require. By this means the appliance is converted into an efficient retaining fixture.

The ends of this wire should be left a little long, so they will have a support against the neighboring teeth. This retainer should be worn until there is absolutely no danger of the teeth returning to their former positions.

INVISIBLE SPLINT FOR LOOSE LOWER FRONT TEETH.

DR. W. B. DAVENPORT, NEW YORK.

International Dental Journal, March.

Having tied the six lower front teeth together with silk, an impression of them was taken with moldine and a cast obtained with fusible metal. A strip of pure gold thin enough to be burnished into place with hand instruments was applied to the lingual surfaces of the teeth on the cast. It covered the upper half of the teeth, curving very slightly around onto the sides of the cuspids, and not quite coming up to the cutting edges of the whole six. The cuspids were firm, but the incisors very loose, which prevented mastication to a great extent. The strip of gold, after being perfectly fitted as described, was strengthened with solder filings, and then pierced with a drill in six places to correspond with holes already made in the teeth, and large enough to admit threaded platinum pins of the size of those in plate teeth, from one-eighth to three-sixteenths of an inch long, as the thickness of the teeth would allow. All the teeth were alive, but the drilling, which was done with the right-angle hand-piece, was accomplished with comparatively no pain, as oil of cloves was used constantly and no pulps were exposed. The drill-holes were above the pulps in each instance, but as near to them as was safe. The alignment of but one pin at a time with its two drill-holes in gold strip and tooth was obtained at a sitting. A drop of wax held the pin securely to the gold, as it rested in position in its hole in the tooth and permitted the removal of the piece without bending the pin. Investing and soldering followed, and was performed six separate times. Finally, the strip of gold plate holding its six pins was set into the teeth with thin oxyphosphate of zinc, and allowed to remain thirty minutes (the dam having been previously applied) before allowing saliva to touch it.

DENTAL MEDICINE.

ACETIC ACID AS A GERMACIDE.

DR. A. W. HARLAN, CHICAGO, ILL.

Dental Review.

The Johns Hopkins Hospital reports that a 7 per cent. solution of acetic acid was found to be more powerful than one to one thousand solution of bichlorid of mercury. The addition of three parts of chlorin in the preparation of acetic acid does not render it less active as a germicide and destroyer of low forms of animal life, and consequently it may be considered in one sense a caustic. It may be used in full strength, or in 50, 40 or 30 per cent. solution, or even less; or in the mouth, in so-called canker sore, with great benefit. A solution between 5 and 10 per cent. is quite strong enough, and it will be found to act admirably. It is a powerful constringer, and it will dissolve the calculus on the root of a tooth.

LACTIC ACID FOR REMOVING CALCULUS.

DR. F. W. LEWIS.

Stomatological Gazette.

Lactic acid is one of the most effective agents in the treatment of pyorrhea alveolaris in the removal of the calcareous deposit upon the roots of the teeth, as it readily dissolves the tartar, which, by long contact, has become so hard as to resist the force of such instruments as can be used well up under the gum or near the apex of the root. It can also be used with impunity upon soft tissues, especially where active inflammation exists. Ordinary soda will be found an antidote should its caustic properties be too great upon healthy tissue.

Dr. Harlan says it does not act on such deposits in a concentrated or pure state, but it does when diluted with water, from two to ten per cent.

AMMONOL, SOME OF ITS USES IN DENTISTRY.

Dental Digest, December.

Ammonol occurs in amorphous-micro-crystals, is strongly alkaline in reaction, and has a pungent ammoniacal taste and odor. An anti-pyretic, analgesic, cholagogue and expectorant.

It is especially useful to the dental profession in controlling and subduing the sympathetic pain resulting from abscessed and congested teeth. Also in those cases where the general tone of the system is low and the ordinary applications fail to bring the accustomed results, and where, from continuation of pain or loss of sleep, all means of relief seem to be unavailing.

ANESTHETIZING THE INCISORS BY PLACING COCAIN IN THE NOSTRILS.

DR. R. H. M. DAWBARN.

International Dental Journal, April.

The upper central and lateral incisors can be benumbed by taking a little pledget of cotton and soaking it in a ten per cent. solution of cocaine and putting it in the nose close to the roots of the incisors and leaving it ten minutes. You can extract or fill the central or lateral incisor with almost no pain. It reaches the nerves of these teeth at a proximal point, so that the anesthesia can travel centrifugally some distance. The nerve is benumbed before it enters the root of the tooth.

COCAIN ANESTHESIA.

Dental Register, January.

It is better, safer and more accurate, says Dr. Hunt, of Indianapolis, to weigh the amount of cocain each time to be used hypodermically. From one-eighth to one-quarter of a grain is, in the majority of cases, sufficient, the maximum dose not to exceed one-half grain. The drug is to be dissolved in a convenient quantity of water.

LOCAL ANESTHETIC.

DR. F. J. WOODWORTH, ROCHESTER, N. Y.

Dental Cosmos, January.

℞	Alcohol	ʒ vij.
	Glycerol	ʒ ij.
	Carbolic acid	gr. x.
	Camphor	gr. ss.
	Atropin	gr. i.
	Cocain hydrochlor	gr. viij.
	Nitroglycerin	gr. j.

The carbolic acid acts as a coagulant circumscribing the action of the cocain. The atropin counteracts the toxic effect of cocain, but may be substituted with antifebrin twenty grains, or possibly menthol thirty grains, with good results.

As an antidote the author recommends amyl nitrite as the best and most reliable.

LOCAL ANESTHETIC.

Dental Register, April.

℞	Oil wintergreen	ʒ ii.
	Chloroform	ʒ i.
	Sulphuric ether	ʒ i.
	Chloral hydrat	ʒ ii.
	Oil of cloves	ʒ iv.
	Alcohol	ʒ xii.

M. Apply with cotton pressed on each side of the tooth.

LOCAL ANESTHETICS.

DR. C. S. PAYNE, SAN FRANCISCO.

Stomatological Gazette, February.

The following formulas were presented to the Stomatological Club of San Francisco, and are appreciated by the club. The glycerin seems to be the only new ingredient, for which Dr. Payne claims much benefit. He says his method of using must be carried out to have good results :

℞	Cocain	grs. i.
	Sul. morphia	grs. i.
	Carbolic acid	mins. iij.
	Chem. pure German double dis. glycerin.	ʒ vi.
	Aqua distilled.	

Q. S. to make a two-ounce mixture.

The above is a 1 to 1000 or a 1-10 per cent. solution of cocain.

℞	Cocain	grs. v.
	Sul. morphia	grs. i.
	Boracic acid	grs. x.
	Glycerin	ʒ vi.
	Aqua distilled.	

Q. S. to make a two-ounce mixture.

The above is a 1 to 200 or a 1-2 per cent. solution.

These formulas are practically useless unless the method of their introduction into the part to be anesthetized is carefully followed. The hypodermic syringe should hold twenty minims, and the needle should not be over 1-4 of an inch in length. The dentist in using an anesthetic uses it almost exclusively for extracting teeth, hence he is injecting into the densest soft tissue in the body: and it requires a great deal more force to infiltrate this gum tissue than it does any other part of the body. The technic is as follows:

Have a clean aseptic syringe, used for nothing else, and a bright needle; have the patient rinse the mouth with a 5 per cent. solution of carbolic acid; with the forefinger of the left hand press on the point on the gum about a sixteenth of an inch from the gingival margin, and turning the needle flat side down slide it in, using some force on the piston, and thus keep the anesthetic in front of the needle. The point of the needle being beveled, the anesthetic is forced at an obtuse angle from its opening, so the force of infiltration is in the direction just described, and by turning it you can direct and govern the area of the zone of anesthesia that is produced and is evidenced by its whiteness. For instance, if an upper first bicuspid is to be extracted and the needle is inserted as directed, by turning the flat side of the needle towards the second bicuspid, you would infiltrate the tissues in that direction; and if you left the needle in the same puncture and turned the flat side towards the cuspid, you would infiltrate in that direction. While injecting lay the forefinger of the left hand above the part being infiltrated at the point where the soft tissue joins the hard gum. If a reservoir, as it were, is found forming in this soft tissue stop and make a new puncture in between the teeth; keep out of this soft tissue, as it will cause swelling. When the tissues on each side of the tooth are so thoroughly infiltrated that they become white, that is sufficient and all that is necessary to accomplish a perfect result. After infiltrating the gum around the tooth, force the flat side of the needle against the tooth, and force it down between the alveolar process and the tooth, and then, by pressure on the piston, force the anesthetic clear to the end of the root.

These formulas are practically harmless in almost any hands, and their efficacy is not due so much to the ingredients used as it is to the infiltration and localizing effect of the glycerin—being due almost entirely to the latter. The glycerin must be absolutely pure doubled-distilled, otherwise it retains properties which are very irritating, and will defeat the end to be accomplished.

SCHLEICH'S LOCAL ANESTHETIC.

Dr. Schleich gives the following three formulas:

STRONG SOLUTION.

For operations on inflamed or hyperesthetic areas, as carbuncles, abscesses, where the pain of infiltration would be very great:

℞	Muriate of cocain	gr. iij
	Muriate of morphin	gr. i-iij
	Chloride of sodium	gr. iij
	Distilled water enough to make	℥ iij

Sterilize by adding 3 drops of a 5 per cent. solution of carbolic acid.

STANDARD SOLUTION.

For surgical operations in general, and especially deep ones:

℞	Muriate of cocain	gr. iss
	Muriate of morphine	gr. i-iij
	Chlorid of sodium	gr. iij
	Distilled water enough to make	℥ iij

Sterilize by adding 3 drops of a 5 per cent. solution of carbolic acid.

WEAK SOLUTION.

For operations on superficial areas not rendered hypersensitive by inflammation, as in the removal of a nevus, etc.:

℞	Muriate of cocain	gr. i-vi
	Muriate of morphine	gr. i-xii
	Chlorid of sodium	gr. iij
	Distilled water enough to make	℥ iij

Sterilize by adding 3 drops of a 5 per cent. solution of carbolic acid.

ANTIDOTE FOR CARBOLIC ACID.

DR. W. C. BARRETT, BUFFALO, N. Y.

Dental Practitioner and Advertiser, July.

Vinegar is an antidote when applied to the skin or mucous membrane burned by carbolic acid, and it causes a rapid disappearance of the characteristic whiteness, as well as of anesthesia produced, and prevents the formation of a slough. It also neutralizes any carbolic acid that may remain, and hence, when the latter has been swallowed, vinegar mixed with equal parts of water should be given, and the stomach then washed out.

CHLORATE POTASH AN ORAL ANTISEPTIC.

DR. P. H. UNNA.

Notes and Remedies.

For mercurial stomatitis and other diseases of the mouth, also for tonsillitis and fetor oris, the writer highly commends pure chlorate of potash in the form of a fifty per cent. paste for the teeth and gums, and as a wash for the tonsils. As a mouth cleanser it is incomparable. The virtue is not so much in its antiseptic quality, but in its tonic properties. It being a neutral salt has no detrimental effect on the teeth. If used in a fifty per cent. form it promptly checks the growth of fungi for a long time and, in many instances, destroys them entirely.

BOROGLYCERIN IN WATER.

Dental Review, November.

Dr. Harlan says: Using boroglycerin in hot water—10 per cent.—adds to its effectiveness when you are about to begin the removal of deposits from the roots of teeth. The patient will notice the change. Condy's fluid should be used about 110° F.

FOR CARBOLIC ACID BURNS.

For burns of carbolic acid on mucous membrane, use glycerin. It is well to apply glycerin to the gum around a fistula, before pumping carbolic acid through. Vaselin will answer.

CARBOLATE OF CAMPHOR.

University Medical Magazine.

One part by weight of carbolic acid to three parts of camphor. Strain through gauze after twenty-four hours. A permanent liquid, thoroughly antiseptic, possessing unsurpassed germicidal powers.

Prevents suppuration applied locally to wounds. Injected hypodermically it gives the best results in aborting abscesses. (Add a little ether or pure alcohol for hypodermic use). Unsurpassed as a lubricant in massage, especially in contracted muscles and stiffened joints.

CARBOLATE OF IODIN.

DR. E. G. BETTY, CINCINNATI.

Dental Review, November.

The writer says he prefers this preparation to any in treating putrescent root-canals, alveolar abscess, etc.

Its preparation is at once simple and easy and should be made just before using. To about two or three ounces of distilled or filtered water, which has also been boiled, but reduced to 100° F., add first ten or twelve minims of Calvert's cryst. carbolic acid No. 1, then the same quantity of officinal tinct. iodin. Stir this up by filling the syringe bulb and injecting back into the glass. The muddy color of the iodin will disappear, with an apparent evolution of gas. A peculiar odor is at once perceived, entirely different from that of either of the principals. When gingival inflammation is present, use as hot as the patient can stand.

COCAIN AND ELECTROZONE FOR CATAPHORESIS.

The time of producing insensibility to pain in a tooth by cataphoresis is much reduced, says Dr. Brown, of New Jersey, by mixing the cocain with electrozone instead of water.

GUAIACOL-COCAIN, FOR CATAPHORESIS.

The following is the formula recommended by Dr. Morton :

℞ Guaiacol ʒ i.
Cocain hydrochlorate gr. v.
M.

CATAPHORESIS.

DR. H. H. SCHUHMANN, CHICAGO.

Written for The Compendium.

The possibility of anesthesia of dental tissues and the dental pulp is now an admitted fact.

To produce anesthesia by cataphoresis, the first requirement is absolute insulation of the cavity containing the positive electrode from all good conducting material, such as the moisture of the mucous membrane, any large approximal metallic filling running down under the gingival margin and thereby producing conduction to a moist surface. The rubber dam always should be applied, and in such a manner that the tooth to be anesthetized is kept thoroughly dry and insulated. When the cavity comes in close proximity to the clamp the latter should be coated with chloropercha. I prefer to use a clamp whenever possible, as it not only holds the rubber dam perfectly fixed to the neck of the tooth, but spreads it out so as to give a clear field of vision.

Metallic fillings in the teeth need not be insulated unless they be large approximal fillings running under the gum, thereby conducting the current directly to the mucous membrane. Otherwise metallic fillings (which do not come in contact with the mucous membrane) are rather an assistance (by carrying the current in and through the tooth) than a drawback. In such cases, where for filling purposes, it is advantageous to have more than one tooth exposed to vision, apply the dam in the usual way, to two, three, or four teeth (as the case may be), then slip a second piece of rubber over the clamp and the tooth to be anesthetized, thereby insulating that tooth from the others. After anesthesia is complete, this second piece of rubber is removed, leaving the tooth to be operated upon clear to view, as in any ordinary case. No one should attempt the use of the electric current for cataphoresis, or for any other therapeutic purpose, unless he has sufficient knowledge to be able to use some judgment, and to know the reason of and the effect of the different poles he is using.

First of all, we must remember that the polar effect of the electric current is anodyne if produced by the positive electrode, or anode, and the reverse irritating if produced by the negative pole, or cathode. To produce an anodyne effect then on any given part, it is necessary not only to supply the part with positive current, but to counteract as much as possible the law of electricity, which states that the two different currents will seek to find each other as quickly as possible. It is therefore paramount not only to supply the part to be anesthetized with the positive electricity whose individual effect we are seeking, but it is also necessary to keep away the negative, or cathodic current, which would tend to weaken the effect of the anode, or positive. It is for that reason in practice that it is best not only to place the cathode as far away from the receiving point of the current as possible, but to use a negative electrode so shaped that it will immediately allow the outflowing negative electricity to spread out over a large area, and not collect itself on any small surface near the distributing point of the positive current.

Instead of the electrode usually furnished with the now common dental outfits, an electrode made as follows is advised: A large felt mitt (glove) encased in a removable soft rubber bag, the felt having fastened to it a metallic connection whereby it can be attached to the negative cord of the rheostat. To use this glove the felt is withdrawn and moistened, then connected to the negative cord, and put back into the rubber bag, when it is ready for use. No cauterized spots from such an electrode! It not only has the advantage already spoken of over the small poles usually furnished, but another, and one that is quite valuable to those practising dentistry in fire-proof buildings where grounded currents are a common thing, and that is, that by placing this glove on the left hand of the patient, a sudden start or move of the hand to the fountain cuspidor, or any other uninsulated metallic connection on the chair, cannot cause a shock on account of the rubber covering of the glove.

Next in importance is the rheostat, which is the instrument used to regulate and turn on or off the current which is to be used. It makes but little difference what sort of a rheostat is used, as long as it is of good make. The amount of current used depends on the work to be accomplished. For anesthesia of dental tissues from fifteen to twenty volts are sufficient. For the purpose of devitalizing a tooth and the immediate removal of the pulp, from twenty to forty volts. The rapidity with which the current can be turned on in each individual case, will depend upon the ability of the patient to receive the electricity. In some cases it may take twenty minutes to apply the first five volts, while in others, four or five minutes will be ample time not only to apply all the current needed, but to produce full anesthesia.

In using cataphoresis on very nervous patients, you will find that if any pain is felt during the application of the current, it will be most severe during the application of the first five volts, which sensation can be almost entirely overcome by taking ample time in turning on that amount of current; the next five being less irritating, and after the first ten volts are applied anesthesia takes place rapidly.

To find out if the tooth is ready for further work, and anesthesia is completed, a shock of five or ten volts makes a good indicator. It is useless to try to apply cataphoresis through healthy enamel; no insulating material such as it, should ever be allowed to interrupt the current, otherwise such accidents as cauterization are very apt to result, owing to the turning on of large quantities of current through a poorly conducting material. To anesthetize a sound tooth, the enamel must first be drilled through, so as to expose the softer and easier conducting dentine.

As to a preference of a battery over the direct street current: the direct street current, 110 volts, when properly rigged up, is preferable for various reasons. The matter of shocking a patient through accidents by such strong currents can be entirely overcome, at the same time the operator may be sure that in using his rheostat he is always getting the amount of voltage registered on his rheostat, which he expects to be getting, as there always is sufficient current to drive that amount of current through his apparatus; that is to say, that when his rheostat is turned on to the point indicating five volts, he is sure of getting five volts or a fraction more or less, a matter over which he is not so certain when using a storage battery, especially after it has been in use a short time. It is always ready for use, and is no trouble to take care of, besides saving the expense of putting in a storage battery.

Many of the failures in the use of cataphoresis by practitioners in fire-proof buildings, has been due to the neglect of the fact that in almost all of these large iron structures grounded currents are a common thing, and patients would receive severe shocks, or would be severely cauterized by these grounded currents (especially where those small negative electrodes are used on the face). I would advise dentists using a street current or a current outside of a storage battery of 110 volts, in large buildings, to have their chairs thoroughly insulated by placing under them a rubber disk, and also not to forget to insulate the fountain cuspidor from the chair, inasmuch as the water entering the cuspidor furnishes one of the best means of conveying the grounded current to the operating chair. It is needless to say that the saliva ejector must not be used, as it also is connected with the water system of the building. The expense of such insulation amounts to $5.00 or $6.00. Since writing the above, Dr. W. H. Richards, of Knoxville, Tenn., called at my office, showing me a very neat device, the result of his own ingenuity, which, although not originally intended for this purpose, can be used most advantageously in connection with cataphoresis. He has a number of small rubber tubes made of very thin material, which by clipping off a small piece, such piece can be applied as far up on the neck of the tooth as might be desired, forming with the tooth a very exact union. These little bands would come in very handy in such cases where the current is to be used in a deep approximal cavity, where it might be almost impossible to carry the ordinary rubber dam up to the cervical margin of the cavity, thereby insuring its being kept dry and away from the mucous membrane of the mouth.

In using high voltage, the operator should be cautioned of the patient complaining of drowsiness or dizziness. In such cases, immediately discontinue the use of the current. Also should be guarded in the use of the current in pregnant women.

Another point well worthy of mention, is the fact that the positive pole must be held absolutely steady in the cavity. For this purpose a small electrode that can be fastened to the clasp on the tooth, leaving the operator's hands free for use on his rheostat, or milliampere meter, or any other instrument he may be handling, is preferred; or by attaching a fine wire to the end of the positive pole, the wire can be bent into the shape of a hook so it will hang into the cavity and cotton of its own accord. Only a movement of the cheeks or lips are liable to dislodge these arrangements, and for that reason I prefer holding the anode with my left hand. Great care must be taken to have the pole placed so that it will not squeeze out a lot of surplus cocain to run all over the tooth, clamp, and rubber dam, thereby causing the current to spread out and possibly be led off into the mouth. I never use cataphoresis on the soft tissues, as I prefer hypodermic injections for that purpose.

CHLORAL CAMPHOR.

A little of this preparation applied to pockets around the teeth will allay the pain of removing the deposits on the roots in many cases.

THE TECHNIQUE OF CATAPHORESIS.

DR. HENRY W. GILLETT, NEWPORT, R. I.

Written for The Compendium.

Voltage is the term used for describing the electro-motive force or intensity of an electric current. It is used in the same sense that pressure is used for steam or water power.

The volt is the unit of measurement of electrical intensity, and is used in the same sense that pounds per square inch is used in steam-pressure. Volt and voltage refer only to intensity or pressure. A ten-volt current is working under twice the pressure of a five-volt current.

Ampere is the unit for the measure of quantity. A one-volt current, working through a resistance of one ohm, delivers electricity at the rate of one ampere per second. Ampere corresponds to gallons or cubic feet in water flow. A five-ampere current means that five amperes per second are passing through the circuit.

In medicine, we use very small quantities of current, and consequently use the milliampere (milli), or thousandth part of an ampere, as the unit. A current of one milliampere means one milliampere per second, two milliamperes means two per second, etc., passing through the circuit.

Ohm is the unit used for the measurement of resistance to the flow of current.

The first and one of the most essential points to consider in the technique of cataphoresis is the apparatus to be used.

Nearly all of these outfits are, in principle, the rheostat, which has been in familiar use for many years.

There are two methods of controlling the current for this use, one represented by the ordinary rheostat in the working circuit, acting as a check to reduce the quantity of current flowing. To this may be added the cell selecter, or with the street current its equivalent, the lever for admitting the voltage in sections. In the second method, the current in the working circuit is controlled by varying its voltage or intensity by means of a rheostat placed in shunt with it.

There are two street currents, the direct and the alternating. The latter will not be considered, as it cannot be used for cataphoric purposes, while both may be used for power or lighting purposes.

The direct 110-volt current is very satisfactory if the source of power be carefully managed, and the system not be overloaded with commercial work. The current will not be so satisfactory in wet weather, and during electrical storms it is not safe to use the current.

Any kind of battery may be used for this work, provided it is properly proportioned to the controlling device.

The current consumed in this work is very small in quantity, and a set of "dry battery" cells provides ample power for such work and requires no care. They should last from one to two years for this work as a minimum. There is a great difference in dry batteries as regards satisfactory performance, and only well recognized and tested kinds should be purchased.

The current from such a set of cells has the merit of being steady in its flow, and of being free from outside influences.

A storage battery capable of delivering a current of voltage suited to the controlling device would be equally satisfactory, but probably more expensive and more liable to injury from careless use.

When a battery is employed the current should always be switched off after use, otherwise it will exhaust.

The next piece of apparatus to be considered is the milliampere meter. It is a very desirable adjunct to any work in cataphoresis, and is an essential to the operator anxious to get the best results every time. In no other way can the operator know how much current he is administering in a given case, and in many cases this is important. The same voltage used on different teeth produces very different results as regards quantity.

Another use for the milliampere meter is to detect leakage of current in other directions than through the tooth. It frequently happens that there is a little leakage of current under the rubber dam where it fails to hug the tooth closely. The operator may not observe it, and as this will be much the easiest path for the current, it will go that way instead of through the tooth. Owing to the great difference in resistance, more current will flow through such a circuit than through a tooth.

The meter is also very serviceable in revealing any disorder or breakage in any part of the apparatus.

A volt-meter is frequently an aid to accurate and intelligent work.

The combination of the volt-meter and mil-ammeter is not difficult, and ought not to be expensive. All manufacturers, however, charge comparatively high prices for even simple meters.

For dental work, the so-called torsion meter is not as reliable as one with the needle mounted on delicate pinions either with or without jewels.

It is entirely feasible to have an inexpensive galvanometer needle mounted by any competent electrician in such a manner as to serve the purpose of a milliampere meter for dental work. It can be calibrated (a scale marked for it) by connecting it in series with a standard meter. The mil-ammeter should be so arranged that the needle will swing nearly a half-inch in registering the first milliampere.

In this work we ordinarily deal with fractions, sometimes small fractions of a milli, and the meter in most frequent use for medical work, in which the scale gives a reading of a hundred millis or more, and each milli is represented by a space of about an eighth of an inch, is of very little value to us.

The next important feature to consider is the electrodes. The simplest form for them to take is that of the ordinary sponge electrode for the negative, and a needle-holder with a curved platinum wire for the positive.

The difficulty of standing by the chair and holding the electrodes for the necessary length of time has led to the introduction of numerous devices for doing this automatically. Several methods for attaching to clamps have been suggested for the positive electrode, and often times this is a satisfactory method. A vulcanite block may be made so as to slip on to the bow of the clamp, and may have a socket or screw so arranged as to hold the wire for the electrode tip, and also the end of the cord. This clamp may be placed on any convenient tooth.

For cavities in the front teeth, or for buccal cavities, a convenient electrode is made by taking a piece of wire three or four inches long, doubling it by bending it in the middle and then twisting one leg of the U shape so formed around the other for a half inch or so, to make a small loop for attaching the tip of the cord; then bending the two wires apart close to the point where they have been twisted, bend them again towards each other, so the tips close together, just as the thumb and forefinger do when they are used to pick up a pin. These two tips, when sprung apart and slipped into the cavities, one from the palatal and the other from the labial or buccal side, hold in place very nicely.

Another very effective automatic method for holding the positive electrode is that suggested by Dr. Van Woert, by making use of spring wire bent into U shape, and the ends turned at the desired angle for entering the cavities. These are sprung open widely, then, when compressed and one end dropped into the cavity and the other allowed to spring against the rubber dam, they hold themselves. Several devices may be utilized for attaching the cords to these. One simple way being to bend a small loop in the wire at the base of the U of such size that the cord tip can be sprung into it and held tightly.

All attachments for joining the conductors of the current should be rigid, either held by a screw or by the pinching of strong metallic springs. More movement is allowable in the cavity, as we have liquid then to complete the connection, and a slight movement does not interfere. These home-made electrodes may be improved by first slipping the wire through the very small French catheters to serve as an insulation, and subsequently cutting it away at the points where it is desired to expose the wire.

The positive electrode is better made of platinum, as this metal is not acted on by the current. German silver will do, if the point is kept bright.

Dr. W. A. Price's suggestion that fine platinum wire be packed in the cavity with the wet cotton, to serve as the positive electrode, is most excellent.

Platinum only can be used with safety in bleaching dentine by the cataphoric method. The sponge of the negative electrode soon becomes too dirty for use; it may be stripped off and a couple of layers of cottonoid, freshly applied, used as a cover for the metal parts for each application.

Dr. Van Woert's suggestion for the negative electrode is excellent: A smooth piece of block tin, say one half by one fourth inch, and an eighth inch or more thick, with all angles rounded (the larger it is, so long as it is not too cumbersome in the mouth, the better it will work), is placed on an insulated stem with a suitable curve and an attachment for the cord at its end. After applying the rubber dam, this electrode is slipped under it and up under the cheek. This entirely cuts out from the working circuit the skin which has a high resistance, and a sufficient quantity of current flow can be obtained through the tooth at a somewhat lower voltage than when the current has to be forced through the skin also. It is necessary to be careful about this electrode when using a considerable quantity of current, as in bleaching, or sometimes in producing pulp anesthesia or in any other work when more than a milliampere of current is used. When one milli or less, however, it seems safe, and even if a lesion be produced it is neither painful nor troublesome.

It is also necessary to guard against this same condition on the skin when using as much as two millis. All metal parts must be kept from contact with skin, and even a cottonoid surface will sometimes produce blisters or rather electrolysis of the surface with such a current. When the negative electrode is used in the hand it should be kept away from finger rings, as these become practically a part of the electrode as soon as they are in contact with the wet cottonoid.

Before proceeding to use the current, certain tests must be made to determine the polarity of the terminals.

To do this, turn on an eight or ten-volt current, and press against the binding posts, or cord tips attached to them, a piece of blotting-paper saturated with a solution of iodid of potassium. The positive pole will make a reddish spot on the paper.

Another good way is to wet a small piece of litmus paper, and apply to it the terminals of the cords leading from the binding posts, holding them about a quarter of an inch apart. The positive terminal will redden the paper, and the negative will turn it blue.

It is needful and important to call attention to the fact that after an apparatus has been connected to the socket correctly, it is necessary to test the terminals frequently, as the polarity of the feed wires of the socket is liable to be changed by changes of connection in the central power-house.

If this occurs it is only necessary to transpose the positions of the ends of the cords where they attach to the plug.

It is also necessary to test the polarity of terminals after changing from one socket to another, as the wires of any two sockets are liable to be oppositely connected.

Several cases of reported failures have been due to one or the other of these causes. The effects resulting from the use of the wrong electrode are highly disagreeable to the patient and mortifying to the operator, as instead of a painless and soothing application, as with the positive, the negative electrode will be found to be highly irritating in its qualities.

When the polarity of a battery outfit has once been determined, it needs no further testing except to make sure that any cords that have been disconnected have been replaced in their former positions. Usually the movements of the meter needle are a sufficient indication in such cases. It will move backward if any cords in the circuit have been transposed.

If a milliampere meter is to be used, and it is not already permanently connected, it is to be placed in circuit by carrying a cord from the previously determined positive binding post to the positive post of the meter (the one marked +). The cord attached to the electrode for use on the tooth is to be attached to the other post of the meter. The fact that the other post is marked negative is of no consequence and must not lead to confusion. The marks (+ and —) in this case are arbitrary, and indicate only the direction of the current flow necessary to the proper movement of the needle.

Having connected the meter, connect the negative (sponge) electrode to the other post of the volt-selecter, and the apparatus is ready for work.

In making cataphoric applications for obtunding sensitive dentine, the first step as regards the cavity itself is to insulate it from the gum tissue.

This may be best done by applying the rubber dam, and care must be taken that opportunity is not left for leakage under it. A very small crevice at the cervical margin, for instance, will cause a failure by reason of the current taking the easier path.

The next step is to see that the cavity is opened so as to expose the dentine it is desired to effect. It would seem in some cases, that there is evidence of the extension of the obtunding effect in a lateral direction, but this is not to be depended upon. In order to be sure of satisfactory results it is needful either that the tubules it is desired to effect be well exposed to the direct cataphoric action, or else that the application be continued till the pulp itself becomes sufficiently anesthetized to affect the sensibility of the whole of the dentine.

This fact makes the class of buccal cavities sometimes met with, which call for an extension into only superficially affected territory, a most difficult one to deal with by this method.

The cavity having been sufficiently opened and cleared of loose debris and any portions of old fillings remaining in it, it is well to wipe it out with chloroform to make sure that no oily or resinous matter exists which may serve as a partial insulator.

The next step is to insulate all metallic fillings which are so placed that the current may reach them. A coat of any resinous varnish serves very well. Oftentimes the insulation may be made still more secure by adding a layer of any of the soft temporary stopping materials. It is well in approximate cavities between bicuspids and molars, to wipe the sides of the teeth and the rubber with the varnish, and build a little of this temporary stopping on the buccal and palatal sides, converting the two cavities into a single pocket. This makes it easier to use a good quantity of the solution, and still keeps it where it belongs, thus concentrating the effect at the desired point. The insulation of the metallic fillings is partly for this same purpose, and partly because the current given off by a metal surface into sensitive dentine is decidedly irritating, and will not be borne by most patients.

The solution to be used is a matter for some consideration. In the opinion of the writer, nothing has yet been brought forward that is superior to a freshly made (not over thirty-six hours old) aqueous cocain solution of twenty to thirty per cent. strength.

Place in the cavity a loose pellet of cotton saturated with the obtundent solution, apply the positive electrode to it, and having made sure that the indicator stands near or at zero, apply the negative electrode to the selected spot. This may be varied by first placing the electrode and then laying the cotton loosely around it, and this is often the better way, as the resistance of the cotton, even when wet, is quite high. The electrodes having been placed, begin to slowly add current, watching the patient for signs of discomfort, and the meter for indications of current leakage, etc. As the patient begins to show that he is feeling it, pause for the sensation to decrease, which it will do in a short time, varying in length in different cases. The first sensation with most patients is a pressed or crowded feeling, similar to that produced by a wedge between the teeth. The nervous patient, undergoing the experience for the first time, will sometimes call this sensation pain; but a little experience and explanation soon corrects this. If current is increased too rapidly, the sensation changes first to a pain, localized in the tooth, then to a diffused pain in the whole side of the head and face.

As the obtundent begins to penetrate into the dentine, the current may be increased gradually, as the patient will permit, till the meter shows a current deemed sufficient.

A small fraction of a milli is sufficient if continued long enough, but the conditions vary so that it is impossible as yet to set any figure that will invariably prove satisfactory. A large cavity, for instance, will take more current than a small cavity, assuming that the dentine of the two teeth is of equal density. A small cavity in a young tooth will often show as much current passing, with a certain voltage, as a similar cavity in an adult tooth will, with twice or three times the voltage.

The thickness of the dentine covering the pulp is also an important factor to consider. If the covering over the pulp is thin, a low voltage will show a comparatively larger reading on the milliampere meter. In such cases a high voltage should never be used, as it seems theoretically possible to produce electrolysis of the pulp tissue itself if a sufficient current is used in such a case.

The duration of the application varies with many conditions. If the tooth is not too dense and hard (and consequently a poor conductor) a superficial effect should be obtained in five or six minutes. It should, as a rule, be possible to remove the soft decay from the ordinary cavity at the end of that time, without pain to the patient. If it is desired to make undercuts or to cut away considerable portions of sound dentine, longer application should be made. If the tooth is very dense, as shown by a small current for comparatively high voltage, the application must be continued in extreme cases even to twenty or thirty minutes, if deep cutting is to be done.

One of the best guides in judging of the effect being produced is the capacity of the tooth to bear sudden increase of current without pain. In the early part of the application it will be found that the patient will often show evidence of pain if the attempt is made to increase the pressure more than a fraction of a volt at a time, and that it is necessary to wait for that sensation, just short of pain, to subside before adding more current. As the application goes on it will be found that pressure may be added in larger increments, and that the sensation resulting subsides much more quickly than at first. A very deep effect, suitable for drilling to the pulp, for instance, is indicated by freedom from sensation when additions of three to five volts pressure can be made suddenly.

The persistence of the effect varies; about twenty minutes is the shortest time for the disappearance of the anesthesia in dentine. As a rule the effect remains for at least forty to fifty minutes.

Cataphoresis is emphatically not a process to be used for all cases of sensitive dentine. For many cases it consumes too much time as compared with the benefits to be derived, and other more prompt measures will often be equally successful. It is a process that may be employed with invariable success in cases of sufficient importance to warrant its use. In cases when the suffering and consequent nervous strain for both patient and operator is extreme, it will find its most effective field, and in these cases the time needed to make the application will be more than made up by the increased speed possible afterwards.

The technique for anesthetizing the exposed pulp does not differ much from that for dentine. It will be found that the exposed pulp will bear less current at first, and that a low voltage will show a larger quantity of current than in dentine. It will also take longer to anesthetize a large pulp in a molar. Forty-five minutes is sometimes necessary, and in very vascular pulps it is difficult to accomplish it at all. In small and anemic pulps twenty minutes will often suffice.

For bleaching, larger currents may be used as there is no sensation in the tooth. The most frequently used solution for bleaching is the twenty-five per cent. aqueous pyrozone, made as described on page 218 of the Cosmos for March, 1896.

To make the solution put into a glass tube half dram of twenty-five per cent. pyrozone and fifteen drops of water; put it into an evaporating dish in a warm place, and in three or four minutes the ether will evaporate, leaving an active, watery solution of pyrozone.

Compound iodin solution (diluted one half) may be driven into the gum over an inflamed tooth, and it sometimes proves a very efficient application, producing much more prompt results than the application of the tincture to the surface.

NEW METHOD OF ADMINISTERING CHLOROFORM.

Gazette des Hopitaux.

M. Rosenberg contends that the dangers to both heart and respiration are occasioned reflexly by the irritating action of the chloroform on the terminations of the trigeminus distributed to the mucous membrane of the nose, that the same is true of any other anesthetic taken through the nose, and that this may be obviated by first anesthetizing the mucous membrane of the nose by using cocain, which is an antidote to chloroform. Having tried this method in fifty cases, he concludes: 1. The commencement of anesthesia is less disagreeable for the patient, who never makes defensive movements. 2. The excitement stage is often wanting, and is always slight, except in cases of alcoholics. 3. During anesthesia it is very rarely a patient vomits, and if vomiting does occur, there is little retching. 4. Upon awakening the patient experiences no disagreeable sensation, and is not haunted by the smell of chloroform or ether. The method pursued is as follows: The patient is directed to blow his nose in order to clear the mucous membrane, then leaning forward or sitting (never lying), to snuff a centigram of powder consisting of 10 per cent. of cocain hydrochlorate and some inert substance. Repeat in about three minutes and commence general anesthesia. If the operation is prolonged, repeat chloroform continuously, drop by drop.

A NEW METHOD OF CHLOROFORMING.

Dr. H. L. Northrop has discovered a new method of administering chloroform, which, it is asserted, is less dangerous than the old, and is not accompanied by the nausea and other evil effects that have made its administration so unpleasant.

He says: It is a vapor of oxygen passing over into a bottle of chloroform and then conducted to the patient, who inhales the gas mixed with the vapor of the chloroform. It takes three and a half minutes to bring about complete unconsciousness. When two drams of chloroform are used, a patient will remain unconscious long enough for the performance of a half-hour operation. To resuscitate the patient pure oxygen is administered, and consciousness is brought back in a minute with not a single evil effect. The patient feels just as well as if there had been no chloroform administered. When the chloroform is administered by this method the respiration is scarcely accelerated, and the breathing is strengthened by the use of the oxygen. The pulse does not vary four beats from normal. Ordinarily it has been considered dangerous to administer chloroform to patients with slight heart trouble. Administered in this new way it does not seem to affect them at all. Patients have submitted to an operation and left the hospital the same day when the chloroform was administered by this method. This was impossible before, for it took from one to three days to fully recover from the effect of the chloroform.

COCAIN HYPODERMICALLY.

DR. N. S. HOFF, ANN ARBOR, MICH.

Welch's Monthly, August.

If there is inflammation or unusual vascularity use a hypodermic syringe with a small, well-enforced needle, and make injections only under the superficial layers of the gum. Where these conditions are not present, but the gum is in a normal condition, make deeper or parenchymatous injections. Make injections for extracting teeth about one eighth of an inch from the gum margin.

COCAIN HYPODERMIC FORMULA

International Dental Journal, May.

Schleich's formula, as follows, is highly spoken of by Dr. E. C. Briggs, of Boston:

℞	Muriate of cocain	20 centigrams.
	Muriate of morphia	25 milligrams.
	Chloride of sodium	20 centigrams.
	Water	100 grams,

with a couple of drops of a 1 to 100 solution of carbolic acid.

THE USE OF COCAIN.

DR. C. A. DUNDORE.

Medical and Surgical Reporter.

The use of cocain in surgery should not be abandoned because its irrational employment has produced deleterious results.

Always make a thorough physical examination of the patient before injecting the drug.

It should not be used in cases showing organic diseases of the brain, heart, lungs, or kidneys, or in persons of a neurotic diathesis.

Children bear it fully as well as adults.

The patient should always be placed in a recumbent position prior to its employment.

Constriction should be used, whenever possible, to limit the action of the drug to the desired area.

Use a freshly prepared solution for each case.

Distilled water is to be employed, to which phenic, salicylic, or boric acid is to be added.

A 2 per cent. solution has a better effect and is safer than stronger solutions.

Never inject a larger quantity than 1⅛ grains when no constriction is used.

About the head, face and neck, one third grain may never be exceeded.

When constriction is possible, the dose should be as large as 2 grains.

Every slight physiological effect is not necessarily to be taken as cause for alarm.

Cocain does have effect on inflamed tissues.

In case alarming symptoms threaten, use amyl nitrite, strychnin, digitalis, ether, or ammonia.

COCAIN PLASTER.

Dental Record, January.

Take a piece of blotting-paper, the size required, saturate with mastic varnish or carbolized resin, pulverize a tabloid of cocain, spread on surface and apply; the varnish will hold cocain where required, and lips, tongue and throat will not be affected; the result in all painful cases is most gratifying.

A COUNTER-IRRITANT.

Dental Review, December.

Dr. Harlan says wet a square of paper fiber lint with vinegar, cover it with red pepper, not too copiously, and apply to the gum. A small piece of rubber dam may be placed between the cheek and the paper to protect.

DENTINE OBTUNDENT.

Dr. Van Woert uses fifty per cent. sulphuric acid for obtunding dentine. Says he has not found any harmful results. [Much care should be exercised in using this remedy; its affinity for lime salts is great, and there is danger of tooth disintegration.]

DENTINE OBTUNDENT.

Dental Journal, March.

Dr. C. H. Bailey says if tannic acid is sealed in a cavity for a few days, it will obtund sensitiveness of the dentine.

DENTINE OBTUNDENT.

International Dental Journal, September.

After drying the cavity well with hot air, Dr. Bogue applies a mixture of carbolic acid and cocain. He also uses zinc chlorid. by placing a crystal in the cavity and allowing it to melt. Care must be used in this latter treatment, if the cavity encroaches too near the pulp.

DENTINE OBTUNDENT.

DR. GUSTAVUS NORTH, SPRINGVILLE, IOWA.

Dental and Surgical Microcosm, January.

Dry the cavity with hot air, and bathe with creosote. In a few seconds wipe this out, moisten with alcohol, and again dry with hot air; then remove all foreign substance with a sharp excavator or bur, cutting toward the border of the cavity, with a lifting instead of a pressure movement. After this method, if the cavity is too sensitive to prepare for a gold filling, fill with cement; in a few months it can be painlessly prepared for gold.

DENTINE OBTUNDENT.

Dental Cosmos, January.

Dr. F. A. Greene is reported as controlling sensitive dentine by hot air obtained from an apparatus made of a coil of copper tubing, one end of which is attached to a tube and foot bulb, the other to a tube with small nozzle. The coil is heated in a cup of hot water, the temperature of which can be easily raised or lowered by the lamp placed under it. The apparatus is certainly simple and should be very effective.

DENTINE OBTUNDENT.

Stomatological Gazette.

A saturated solution of carbonate of potassium in glycerin gives the happiest results. Allow from seven to ten minutes for the full effect. The glycerin dehydrates the dentine, allowing the carbonate of potassium—an antacid—to penetrate into the tooth substance.

DENTINE OBTUNDENT.

Southern Dental Journal, April.

When the sensation in a hypersensitive tooth is being complained of as unbearable, the application of one-tenth of a grain of the citrate of cocain will yield gratifying results.

DENTINE OBTUNDENT.

DR. S. H. M'NAUGHTON.

International Dental Journal.

The writer reports success with an obtundent composed of equal parts of cocain and thymol, made by heating the two in a test-tube, the thymol being melted, and this in turn dissolves the cocain; or it may be made by grinding the two together, a thick syrupy fluid being the result. For sensitive dentine, place a piece of asbestos paper saturated with it in the cavity and over as broad a surface as possible, covering this with zinc phosphate, and allowing it to remain two or three days or more.

OBTUNDING SENSITIVE DENTINE.

DR. N. S. HOFF.

Dental Cosmos.

Formalin 20 per cent., with chloroform 80 per cent., obtunds sensitive dentine satisfactorily and quickly. Wipe out the cavity with the solution and dry with hot air. It should not be left long in contact with the dentine.

DENTRIFICE.

M. DAVID.

Dental Record, November.

℞	Pulv. Cretæ precip.	ʒ 35
	“ Pumice	ʒ 1¾
	“ Iridis	ʒ 6½
	“ Pot. chlor.	ʒ 1¾
	“ Acidi boraci	ʒ 1¾
	Vanilline	grs. 75
	Sod. fluosilicate	ʒ 6½
	Salol	grs. 75
	Ess. rosæ.	m 75
	Cochineal	q.s.

ANTISEPTIC DENTIFRICE.

Dental Record, November.

℞ Pulv. Cretæ precip.	℥ ij.
" Dimatos	℥ iv.
" Saponis hisp.	ʒ iij.
" Pot. chlor.	ʒ ij.
Ol. eucalypti	m x.
Ess. mentha. pip. (1 in 50)	m x.
Otto rosæ	m vj.

ANTISEPTIC DENTIFRICE.

Dental Record, November.

℞ Pulv. Cretæ preparata	grs. xlv.
" Mag. carb.	grs. xlv.
" Acidi boraci	grs. xxv.
" Pot. chlor	grs. lx.
" Guaiac	grs. lx.
Ess. Mentha. pip. (1 in 50)	m vi.
" Rosæ	m iij.

ANTISEPTIC DENTIFRICE.

M. DAVID.

Dental Record, November.

℞ Pulv. Dimatos	ʒ ij.
" Cretæ precip.	ʒ ij.
" Acidi boraci	ʒ ss.
" Pot. chlor.	ʒ ss.
" Guaiac	grs. lx.
Ol. Sanitas	m x.
" Rosæ (geranium)	m x.

MORTON'S DENTIFRICE.

Stomatological Gazette, May.

℞	Precip. chalk	℥ vi.
	Pulv. cast. soap	℥ ij.
	" borax	℥ ij.

M. Add perfume, and sugar to sweeten.

EROSION TREATMENT.

The antacid treatment, with the present pathology of the disease, is much in vogue. Phillips's milk of magnesia has superseded other preparations. It may be floated around the teeth several times a day, but especially before retiring at night should this be done. It leaves a coating on the teeth which counteracts acidity. The preparation is also excellent for internal use, when there is acidity of the stomach, with eructation.

CAMPHOR FOR ETHER COLLAPSE.

Munch. Med. Woch.

Dr. Schilling says that hypodermic injections of camphor in larger doses than the text-books advise are beneficial in ether collapse. Half-grain doses are very effective, but the results obtained from one-grain doses are extremely gratifying. The solution should be one part camphor to ten parts olive oil. As the camphor is eliminated within two hours, it has no cumulative effect.

EUCAIN.

This is a new local anesthetic. It is not derived from the vegetable kingdom, but is a laboratory product. It is a white crystalline substance, soluble in water. A one to two per cent. solution is used with success by ophthalmologists in minor operations. It has not been much used in dentistry. It has proved to be less poisonous than cocain.

EUROPHEN AND BORACIC ACID.

Pacific Dental Journal, January.

Equal parts of europhen and boracic acid is recommended for pyorrhea alveolaris, alveolar abscess, and inflamed gums.

PAIN AFTER EXTRACTION.

DR. E. H. KEITH, RHINELANDER, WIS.

Written for The Compendium.

To relieve the pain which usually follows the extraction of a tooth, use equal parts of tincture aconite and alcohol.

PAIN AFTER EXTRACTION.

Pacific Dental Journal, January.

For pain after extraction, Dr. Hayes says, syringe the cavity with warm water, to which has been added a little tincture of aconite, and dress with campho-phenique.

AMYL NITRITE FOR PAIN AFTER EXTRACTION, ETC.

Zahnarztlisches Wochenblatt.

Amyl nitrite has been recommended by a number of authorities as a specific for the alleviation of pain after extraction. The patient inhales it for from three to four seconds, and then remains quiet in the chair for at least five minutes. It is not only used after ordinary extracting, or after narcosis, but also after using a local anesthetic. One drop of a one per cent. solution of nitroglycerin in a wineglassful of water has likewise been recommended and used for the same purpose. Both remedies have been used successfully in neuralgia and for headache; they are also used for patients with affections of the heart, who are afraid of a dental operation for fear of a cessation of the action of the heart. Amyl nitrite and nitroglycerin (Glonoin) should be in every dentist's cabinet.

PAIN AFTER EXTRACTION.

DR. D. W. BAKER.

A pledget of cotton dipped in a saturated solution of camphor in chloroform, placed for a few moments in the socket, will almost instantly afford relief. Remove as soon as pain ceases.

FORMALIN OR FORMALDEHYDE.

This agent is a strong irritant, and should be used with care. For dressing putrescent root-canals, from two to four per cent. solution is strong enough.

Dr. Hoff says it is an excellent desiccant for root-canals. Dr. Howe reports clinically and favorably on its use as a deodorizer and disinfectant. Dr. Geo. S. Allen says it is the best all-round antiseptic and germicide that has been brought out. A one per cent. solution is used for disinfecting instruments.

It is bought in forty per cent. strength. Dr. Howe says the way to reduce the strength is to regard the forty per cent. solution as forty parts of the drug formaldehyde, divided by a unit of water, instead of a hundred parts of water, which it really is. If we take an ounce, or a teaspoonful, or any amount, and consider it as stated, and desiring a one per cent. solution, we add thirty-nine teaspoonfuls of water—supposing that we use a teaspoon to make the dilution—and we have divided the forty parts of formaldehyde by forty parts of water instead of one, which we took as our starting point. If we want a five per cent. solution, we add seven teaspoonfuls of water to one teaspoonful of the forty per cent. solution: we have divided the forty parts of the pure article by eight instead of one, and have obtained a five per cent. solution.

APPLICATION TO GUMS AFTER REMOVING TARTAR.

DR. W. X. SUDDUTH.

℞ Plumbi acetatis ------------------ ℥ ss.
Tinct. opii. ------------------- ℥ ss.
Aqua ------------------------ q. s. ℥ iv.

TURPENTINE FOR DISEASED GUMS.

DR. B. H. CATCHING, ATLANTA, GA.

For gingival inflammation ranging from slight gingivitis to severe mercurial ptyalism, turpentine is an excellent remedy, used as a wash. The taste is not very disagreeable if the turpentine is fresh. It is better obtained from paint stores, as they usually purchase it by the barrel, and do not keep it long enough to become rancid, as is often the case with drug stores.

FRICTION FOR THE GUMS.

DR. B. H. CATCHING, ATLANTA, GA.

It is too often the case that the teeth alone are brushed, while it is very important that the gums should receive friction as well. The brush should be turned to the gums; the friction thus caused will, where there is a tendency to sponginess, materially aid in keeping the gums in a normal condition. It is well to use listerine on the brush, where a medicament is necessary.

FUNGUS GUMS.

Dental Review, November.

Dr. Harlan says some cases of fungus growth of the gums will improve rapidly if powdered copper sulphate is used. Antidote with magnesium carbonate.

INFLAMMATION OF THE GUMS.

International Dental Journal, May.

Sometimes the benefits of simple remedies are overlooked. Dr. E. C. Briggs says bicarbonate of soda is often very beneficial in treating inflamed gums.

SPONGY GUMS, LOOSE TEETH.

DR. G. C. BRAUSE, HARRIMAN, TENN.

Written for The Compendium.

For spongy gums and loose teeth, remove deposits, wash out with pyrozone, then with warm water and apply glycerole-pepsin.

FOR HEMORRHAGE.

Dental Cosmos, May.

Dr. A. E. Mascort, of Paris, says a mixture of antipyrin and salol is one of the best hemostatics.

To prepare the mixture, put equal parts of antipyrin and salol in a test tube, fuse over a spirit lamp till clear liquid turns to a hazel color.

DENTAL HEMORRHAGE.

Dental Cosmos, November.

For severe cases of dental hemorrhage, Dr. McNaughton passes a double silk thread through both sides of the torn gum, and ties firmly over the alveolar border. He says, in no case has this failed to arrest the hemorrhage. The stitches can be removed in forty-eight hours.

DENTAL HEMORRHAGE.

DR. J. VANPELT WICKS, BROOKLYN.

Items of Interest, July.

The writer speaks very highly of the following formula for dental hemorrhage:

℞	Pulverized rosin (common)	ʒ iv.
	Carbolic acid (95 per cent.)	ʒ jii.
	Chloroform	ʒ ji.

M.

Make a short, thick cotton rope, larger than the wound to be treated, moisten the end well with the compound and plug the cavity tightly. The bleeding will cease almost as if by magic. Its adherence to the tissue in which it is placed makes it unlikely to be forced out of its place by the pressure of the blood.

After a wound caused by extraction of a tooth has been plugged with cotton for four or five hours, considerable pain ensues, caused by the pressure of the cotton; advise patients to remove cotton after a lapse of a few hours.

DENTAL HEMORRHAGE.

A severe case of dental hemorrhage is reported in the Lancet to have been almost instantly arrested by the spray of ethel chlorid.

DENTAL HEMORRHAGE.

Dr. Roswell Parks recommends antipyrin and tannin. An alcoholic solution of tannin is used, to which is added antipyrin to form a precipitate. Apply the precipitate on cotton or sponge.

CONTROLLING NASAL HEMORRHAGE.

DR. R. H. M. DAWBARN.

International Dental Journal, April.

Nasal hemorrhage is something that we all ought to know how to treat, and it is inadvisable to wait more than a moderate time, trying the various remedies that may possibly succeed and are quite as likely not to succeed, before using means that are absolutely certain. Such a case (save the excessively rare contingency of hematophilia, which one may not see in a lifetime) can always be controlled in two minutes' time, to an absolute certainty. In mild cases, first gently plug the interior of the nose on the bleeding side with gauze, or a strip of handkerchief, soaked either in peroxid of hydrogen, a saturated solution of antipyrin, or dampened with a weak solution of cocain up to five per cent. If these fail, then the scientific thing to do is to look for the cause of the bleeding, which is generally found in the anterior portion of the septum nasi, where, with a good light, blood will be seen trickling from the artery. By means of a metallic point, heated nearly red-hot and applied to the surface, it may be cauterized, and the bleeding checked almost at once. In the rare contingency where the bleeding-point is so far back as not to be seen with the aid of a forehead-mirror and reflected light, we can always control the hemorrhage instantaneously by tamponning the nares. If the anterior naris is plugged, the posterior should be also, because otherwise the blood may continue to flow into the pharynx and be swallowed, the patient not realizing how much blood is being lost. All that one needs for tamponning the anterior and posterior naris is an ordinary soft-rubber catheter, such as is used for drawing urine. Pass this through the nostril on the affected side, and presently its point appears in the pharynx. Seizing this with a pair of thumb-forceps, or a dressing-forceps, it is drawn out of the mouth; so that one end appears through the nose and the other out of the mouth. Upon one of these ends tie a doubled piece of soft twine, say a yard long, and by completely withdrawing the catheter the twine is drawn into place; so that we have the doubled twine entering the nose and escaping at the mouth. Upon the middle of this doubled twine tie a posterior plug, folded from a piece of handkerchief, about the size of a large marble, and draw it into place. The anterior plug, much smaller, is now tied in place, aided by the doubled twine, and we are able to do this more tightly than we could have done with a single piece of twine. Now, the front and back of the nose being absolutely closed, and connected by a tight string, all the blood that can flow will be the small amount which may fill one half of the nose. The loose ends of string coming from the mouth and nose are tied together.

Such a tampon is left in place twenty-four hours, and the patient is warned not to try to blow out the blood-clot subsequently. This method of tamponning is much less annoying to the patient, uncomfortable though it is, than to insert a rubber or other sheath into the nose, and distend it with either water, air, or a gauze packing. The interior of the nose never was meant to be subjected to any other pressure than that of the atmospheric air. By the first method of tamponning the very sensitive turbinated bodies are not subjected to pressure; by the second method, which is extremely uncomfortable, they are subjected to a direct pressure. The patient should be sitting upright. If you use a little cocain spray, the operation is hardly annoying at all. As to how firmly to draw this rear tampon into place, a good rule is to draw it just for a moment with almost force enough to lift the patient's head by it. If peroxid of hydrogen is used, an objection to it is that it is irritating.

DIAGNOSTIC SYMPTOMS FOR HYPERCEMENTOSIS.

Dental Cosmos, August.

Dr. Geo. A. Maxfield, Holyoke, Mass., offers the following as good diagnostic signs of this trouble:

First.—The offending tooth must be on the same side as that on which the pain is located.

Second.—We must have as complete a history of the case as possible.

Third.—Note the articulation, whether there is excessive, or lack of function.

Fourth.—Examine carefully for cases of pulp-irritation, and note the condition of third molars. After satisfying ourselves that the pain cannot be caused by either of these conditions, we may pronounce it hypercementosis.

Fifth.—Concluding the pain to be caused by pulp-irritation, as noted by the cavities or fillings—having devitalized the pulp and filled the canals—the pulp pain continuing, we may conclude it is a case of hypercementosis.

TINCTURE OF JESSAMINE IN DENTISTRY.

DR. WILLIAM DUNN, FLORENCE, ITALY.

Written for The Compendium.

Tincture of jessamine is an elegant application for inflamed gums; apply like aconite. Five drops taken internally in a wine-glassful of water often will stop obstinate neuralgia.

TO APPLY LEECHES.

DR. W. C. BARRETT, BUFFALO, N. Y.

Dental Practitioner and Advertiser, April.

The leech is placed in a teat-tube partly filled with water. The open end of the tube is then placed against the part, when the leech promptly fixes itself to the skin.

LORENTIN, AN ANTISEPSIC.

This is an iodin preparation with the formula of C_9 H_4 in OH. SO_3 H. It is a bright colored crystalline powder, slightly soluble in water and alcohol, with all the good qualities of iodoform and not the bad odor. It is non-toxic. For treating putrescent root-canals it is excellent. In fact, its uses are those of iodoform, with all the disagreeable features of iodoform removed.

MILK OF MAGNESIA AS A CORRECTIVE.

Items of Interest, December.

As an antacid, the milk of magnesia is superior to all bicarbonate of soda and chalk preparations, and is invaluable in cases of erosion. Where iron preparations are used as tonics, first coat the teeth with the magnesia preparation, then take the iron, brushing the teeth thoroughly and rinsing the mouth with more of the milk of magnesia. The teeth do not discolor nor are they attacked by the iron; the mechanical protection furnished by the magnesia being their saviour.

SYSTEMIC MEDICATION FOR DENTAL PURPOSES.

DR. ELGIN MAWHINNEY, CHICAGO.

Dental Review, February.

The four fundamental principles upon which all successful therapeutics must be based—First, the condition of the part; second, the condition of the circulation; third, the condition of the nervous system; fourth, the condition of the alimentary tract. If they be not in favorable condition they should receive attention, if not first, then simultaneously with the part.

For dental practice we must look at three factors.

1. Systemic treatment for the purpose of preventing unnecessary suffering during operations.

2. Systemic treatment as an aid to recovery from diseased conditions of the dental organs.

3. Agencies that are of value in aiding tooth development.

Slight changes in mind functioning cause marked changes in the physical organism. It appears that the chemist can even tell from the perspiration the nature of the thoughts in mind during or immediately preceding its excretion. It may appear trivial when I insist that fear is a very great factor, not only in the amount of pain produced, but also in inducing grave disturbances of the whole system—disturbances which have in some instances proved fatal.

It is not infrequent that adults of both sexes faint upon entering the operating-room, which is simply fear carried to such an extreme that it paralyzes certain nerve centers.

What can be done to overcome these conditions?

First in importance is the influence of the operator and his surroundings. The things done to overcome these conditions are many and varied, but most of all will be the influence of the operator's personality. Second, the administration of proper sedatives.

When fear is the principal factor to be treated I have succeeded admirably in many cases with trional. Trional is a powder consisting of shining scales, soluble in 300 parts of water at ordinary temperature. It is almost tasteless and odorless. Its effects are prompt and can be relied upon. It is comparatively safe and does not cumulate in the system. It does not produce any after effects that are in the least unpleasant. The system does not become habituated to it. As a simple hypnotic in all nervous conditions where pain is not a factor it is the most valuable agent I have used, but when pain is one of the conditions to be overcome it is less valuable than some other agents. It should be administered in doses of 5 to 30 grains, twenty minutes before attempting to operate.

Sulphonol possesses pure hypnotic properties without anodyne effects. It possesses advantages over the opiates in that it does not constipate, and is free from unpleasant after-effects. It seems to act best when given in single large doses—10 to 15 grains—for the purpose we are considering it.

When pain is a factor in the nervous, irritable condition, valuable assistance is had from lactophenin, codein, morphin, chloral, hyoscyamus, bromide of potassium, cannabis indica, each given in proper dose, the idiosyncrasies and systemic conditions in the main determining which to use. All of these drugs are comparatively safe, but care should be exercised to prevent unpleasant after-effects.

There are four general classes of pathological conditions in which systemic medication is needed in our special field:

1. Hyperemic conditions. 2. Inflammatory conditions. 3. Neuralgic conditions. 4. In those cases where the diseased part is a local manifestation of a systemic disturbance.

Of the two forms of local hyperemia with which we have to deal, the passive will be most aided by systemic medication; for, with but few exceptions, such as that arising from irritation to tooth-pulp, active hyperemia never rises beyond a physiological process, and when it does it rapidly passes into an active inflammation, which will be considered later.

Passive hyperemia in the dental organs frequently occurs from a great variety of causes, all the way from simple obstruction of the veins leading away from the part affected to general lowered vitality of the whole organism, including pathological conditions of the heart where it does not exert sufficient propelling force, all of which, when early recognized, yield readily.

The systemic treatment must consist of: First, the use of those drugs which, acting through the vaso-motor system, will dilate the venous system, at the same time stimulating the heart directly, increasing the force and frequency of the pulse. Second, the use of those agencies that will stimulate the lymphatics to take up the exudate and throw it back into the blood current.

For the purpose of dilating the veins and at the same time stimulating the heart, good results may be had from alcohol in minute doses, and from liq. am. acetatis, in 1 ʒ doses; Dover's powders, 5 gr. doses; trinitrin, in 1 drop doses of the 1 per cent. solution.

For the purpose of stimulating the lymphatics, sulphid of calcium in one-tenth gr. doses and flush the system with water.

We have inactive inflammation of the periosteum and peridental membrane and the tooth-pulp, a condition of the general system with which we are all familiar. The rapid, forceful pulse, the swollen, heated tissue, the high-strung nervous tension, and sometimes general exhaustion, the foul secretions, the clogged excretions, the abnormal temperature, all of which in the early stages are usually accompanied with severe pain. In all such disturbances, wise systemic medication will be helpful. True, many such cases yield readily to local measures, but there are no cases of this nature where systemic medication will not be helpful, and indeed many where it is absolutely essential.

In the simpler forms of inflammation in these tissues, before the stage of the pus formation, to slow the blood current, quiet the nervous system and stimulate the secretions and excretions will be all that is necessary. For these purposes good results are had from tincture of aconite, veratrum viride in minim doses every half-hour until relieved, tincture of gelsemium in ½ minim doses every fifteen minutes until six minims are taken, then skipping an hour, etc.

Tongaline has given good results. Sulphid of calcium used as a preventive of pus formation. Quinine is also of value.

When a nervous condition is prominent good results are obtained from Dover's powders. In addition to this give a good cathartic and diuretic and recommend a hot foot-bath and large quantities of warm water taken by way of the stomach.

In the severe forms of inflammation resulting in abscess of antrum, alveolar abscess, necrosis, septicemia, etc., the case in hand must determine the treatment needed. The treatment just indicated will be helpful, but strict attention must be paid to digestion, assimilation, excretion by way of lymphatics, skin, kidneys, and bowels, and when any one of these is sluggish it should be stimulated by the means best adapted to the case in hand. Prescribe for the conditions before you. In many cases dentists fail to effect cures simply because they do not recognize that the vital forces are so reduced that the reparative processes are stagnant.

Teeth many times, though weak in structure, withstand the progress of decay throughout a lifetime, while teeth of perfect structure and calcification are ruined by its ravages before maturity is reached. It seems evident that the general systemic conditions have much to do with the progress of decay as well as the progress of any disease dependent upon germ life. In a life where all the functions of full nutrition are perfectly formed there is a remarkable absence of all these disorders.

In treating those obscure facial neuralgic affections which are not dependent upon diseased pulps, the treatment must be in accord with the general systemic conditions. These affections rarely occur in any but neurasthenic or anemic individuals, and are sometimes confounded with reflected pains from a great variety of disturbances. When the cause lies in a tooth-pulp or peridental membrane, to simply remove the irritation will not always prove sufficient, for the nerve tract often continues to transmit sensation after the irritation is removed. For the purpose of relieving this condition employ fluid extract of tonga, antikamnia 4 $\frac{3}{4}$ grains, and codein $\frac{1}{4}$ in combination, quinine and salophen.

There are diseases of the peridental membrane both with and without calcareous deposits, dependent upon constitutional causes, and so far as I am now able to determine they seem to be of a scorbutic and gouty nature, and in addition to removing the deposits mechanically we must look to systemic medication for valuable aid in effecting cures. In those gouty conditions there is no increased formation of uric acid as many have claimed, but instead the blood is only faintly alkaline, and therefore quite incapable of holding uric acid or its salts in solution ; so that at least it is theoretically true that any agent capable of assisting the blood by rendering it more alkaline will be valuable in correcting and avoiding these disorders. For this purpose I had for some time used bitartrate of lithia with apparently good results, but it often proved so irritating to the stomach, causing violent nausea and headache, that I have abandoned it except as found in the lithia waters.

For the past eight or nine months I have been using lycetol, an alkaline tartrate of dimethyl-piperazine. In the organism it seems to be converted into the carbonate, which renders the blood more alkaline. It has the advantage of being very palatable, not unlike lemonade. It can be given in quantities of 15–45 grains a day without any deleterious effect upon the stomach. The usual mode of administering it is 5–10 grains in a tumbler of water three times daily, half an hour before eating. It is a certain prompt diuretic. With it I have had several happy results, especially in those cases of swollen, suppurating gums with pockets high up on the root where there were no appreciable deposits. However, I have come to the conclusion that more can be done for these chronic cases by a well ordered dietary, aided by abundant exercise in the fresh air than in any other way. In all cases of perverted nutrition, whether it be shown in a general lowering of the tone of all the vital forces and excretions, or in a poorly calcified tooth, the best treatment will be to furnish nature with natural sources from which to draw her needed elements, and then by careful hygienic measures aid her to extract them. How the notion that the administration of chemical preparations of phosphorus and phosphates should aid in the development of bone and dentine should get such a hold upon the minds of the profession I cannot understand. How the administration of a few grains of phosphates can supply a deficiency of phosphorus in the system when it is daily excreting not less than 54 grains is simply inconceivable. Nature always prefers to be her own laboratory, and gather from nature's sources the elements needed for her upbuilding. Better far to stimulate the system to take these phosphates, etc., from the many forms of wholesome food in which they are so abundant, and the best means of thus stimulating the system is in enforcing clean, wholesome dietetic habits, abundant exercise and careful respiration.

SILICO-FLUORIDE OF MERCURY.

Pharmaceutical Era, September.

This salt has been recommended as being twice as energetic as corrosive sublimate as an antiseptic. It is far less poisonous than the latter salt; hence, it deserves attention. It is used in aqueous solution 1 to 1000.

TO PROTECT INFLAMED MUCOUS SURFACES.

Dental Review, December.

Subnitrate of bismuth, slippery-elm water or acacia water may be used to protect inflamed mucous surfaces.

FACIAL NEURALGIA.

Dental Review, December.

Croton chloral, in doses of three to five grains in pill every two hours, is said to be very effective in facial neuralgia.

PREPARATION AND APPLICATION OF NERVE PASTE.

DR. WITHOLD LINDEMANN, RYBINSK, RUSSIA.

Correspondez-Blatt fur Zahnartze.

With Kirk's arsenious paste (with a slight modification) one may prepare an excellent quality by extremely finely triturating in a porcelain mortar arsenious acid (two parts), which is difficult to pulverize, with one part of pumice and a little carbolic acid in such a manner that even with a 150 magnifying power no arsenic crystals can be distinguished; hereupon are triturated with the mass two parts of cocain, and one part of menthol; other additions are superfluous. A very small quantity of this paste is laid upon a pellet of cotton the size of a pin's head, and this plug is applied direct upon the exposed pulp. A temporary closure of the crown-cavity with sandarac or mastic solution, however, requires a little knack.

In order to avoid the inclosure of the paste, and prevention of its action by the resinous solution, the cotton soaked with the resin should never be laid direct upon the arsenious paste; the two plugs should always be kept separate by means of a pledget of cotton moistened with water. The action of the arsenic will then be undisturbed, and the hardened resin will not exercise any pressure upon the pulp.

At the expiration of twenty-four hours the pulp in most cases will be so void of sensibility that it can be partly removed; otherwise the cauterization should be repeated.

PERICEMENTITIS.

Instead of painting the gums with aconite and iodin, it is said a better way is to inject it into the gums close to the alveolar margin. Care should be taken in such a use of aconite.

ACUTE PERICEMENTITIS.

Dental Cosmos, December.

For teeth which have been filled, probably for years, and have not given trouble, but suddenly become sore and elongated, Dr. Watkins prescribes ammonol in ten- to fifteen-grain doses. Many cases, he says, will subside in a few moments, others in a few hours.

PREMONETORY SYMPTOMS OF PERICEMENTITIS.

International Dental Journal, May.

In a Talk on Materia Medica Dr. E. C. Briggs, of Boston, makes some good suggestions. He says when a patient presents for whom a root has been filled and complains of soreness about the tooth, but with no definite lesion manifested, and where it is not practicable to act surgically, he prescribes an antipyretic and analgesic, and likes best antikamnia. The dose is three grains, repeated four times if necessary.

SYMPTOMS OF COCAIN POISONING.

DR. SAMUEL M. HOPKINS, BOSTON.

International Dental Journal, July.

In a general way, the symptoms of cocain-poisoning may be briefly described as follows: There is an excitation of the mind, and associated with it an expression of anxiety which may amount to a fear of approaching death. A feeling of warmth steals over the patient, which may be followed by a chill. The respiration becomes fearfully rapid, and later becomes labored. The pulse-beat increases to a very marked degree, and the pulse runs up to 150, or even higher. Respiration becomes more difficult, and the heart grows weak, while the mental disturbance is increased so that ideas do not follow each other in proper sequence. If the drug has been administered in the mouth, the tongue becomes numb and speech is affected; not always, however, to such a marked degree as might be expected. If the poisonous effects continue, there seems to be more general anesthesia, and the organs so affected have a decided feeling of cold. Sometimes an irritation along the spine or back of the neck, a tickling or itching sensation, is present. The hands are closed in a convulsive manner; the fingers, legs, and arms become stiff and tetanic. The muscles of the face partake of the convulsive movements, and the expression is agonizing to the last degree. In some cases death occurs while in this tetanic condition. Sometimes, however, instead of the convulsive symptoms complete relaxation takes place. If recovery occurs, severe nervous disturbances may remain for an indefinite time.

PAPINE FOR DIGESTING PULPS.

Dental Review, April.

Papine, for digesting pulp-remains, is used by Dr. Harlan successfully, by making a paste with sterilized water and sealing it in the cavity for three days.

RELIEF OF PAIN FROM CONGESTION OF THE PULP.

Dr. Harlan says: Wash the cavity with peroxid of hydrogen, and quickly dry it. Apply pure chloroform on cotton, then melted carbolic acid. In five or ten minutes the patient will be comfortable.

SYMPTOMATOLOGY AND TREATMENT OF INFLAMMATORY CONDITIONS OF THE PULP.

DR. W. C. BARRETT, BUFFALO, N. Y.

Dental Practitioner and Advertiser, October.

The symptoms of pulpitis must necessarily vary with the pathological state. Usually, the first indication is a sensitiveness to thermal changes. Cold air or cold water cause a pain of a sharp, lancinating character. Not infrequently the neck of the tooth, or any abraded surface, is also sensitive to any outward irritant, such as a metal toothpick or instrument. This indicates dentinal irritation. The responsiveness to thermal changes increases and becomes more persistent, until there is a distinct odontalgia, or toothache. This pain will be rather paroxysmal, returning upon slight provocation, and passing away in a few moments. It may be difficult for the patient to determine exactly which tooth is affected, because the pain may be distributed along the track of the nerve. Successively isolating each tooth by the rubber dam, and the application of alternate heat and cold, will, however, usually determine the matter. Sometimes there is a response to percussion, and a diagnosis may be reached through that. This earlier stage will be that of hyperemia, and the beginning of engorgement or congestion. The exalted sensibility is due to the irritable condition of the nerve tissue.

With the exacerbation of the inflammatory condition the pain becomes more intense and continuous. With the increase in congestion the pulp, which is held immovable within the bony tooth walls, becomes intensely irritable, and the pain, instead of being intermittent, becomes almost continuous. The lancinating flashes can no longer be distinguished, but are so quick succeeding as to be practically unintermittent, and there is at the same time a deep, boring pressure felt, which indicates that the inflammation is passing to its second stage, that of effusion, in which there is a passing out of the elements of the blood into the tissues.

Up to this time the vitality of the pulp may readily be preserved, if active measures are taken for the relief of the inflammatory condition. This stage once passed, and extravasation into the pulp tissues having taken place, the probabilities are largely against conservation.

At this point the pain changes its character somewhat, and it is not of such a sharp, lancinating nature. It becomes more steady, and less intermittent, or paroxysmal. There is a greater feeling of pressure, and it is more readily located. The pulsation, which, up to this time, is sometimes very distinct, now ceases. The congestive stage is at its height, and entire stasis of the blood current in the pulp is imminent. Heretofore cold has been irritative and warmth quieting. The opposite condition now ensues, and ice-water will relieve the pain, while any warm application exacerbates it. The suffering caused by the affected organ is intense, but the end is probably near at hand. With complete stasis, sensation is gradually lost, the pain progressively abates, neither cold nor heat aggravate, and the tooth is unresponsive to any ordinary irritant. The inflammatory process has run its destructive career, and the pulp is dead. This is the usual train of symptoms, and the ordinary progress of the disease.

The treatment in the earlier stages will be abortive. The first essential is to make a clear diagnosis of the case, by carefully considering all the symptoms. The exact stages of the disease should be determined, if possible. This having been done, the next point will be to remove the cause. If it be progressive caries, the cavity of decay should be carefully washed out, all debris removed, and an anodyne introduced. If any foreign substance is the irritant, it must be at once eliminated. The tooth must be relieved of all labor of mastication, and given entire rest. Counter-irritants, such as iodin and aconite, capsicum bags, ammonia, and even cantharidal applications are useful, by promoting metastasis. That is, a new focus of inflammation is created in a proximate territory, but which is upon the surface, where it can be reached, and resolution may be expected. This has a tendency to divert the impending blood-currents, and thus to relieve the threatened engorgement of the pulp.

Hot pediluvia, or foot baths, should be prescribed, the water to be as hot as can be borne, and these to be continued for at least thirty minutes, for the purpose of equalizing the circulation and relieving the plethoric condition of the pulp.

Saline cathartics are useful, because they relieve the blood tension, removing from the sanguinary fluid a portion of its watery constituent, and thus greatly depressing the tension.

Diaphoretics are perhaps the most important of the general remedies. They not only extract a considerable amount of water from the system and from the blood current, but they act as general depurators, promoting healthy functional action, and removing local obstructions.

Anodynes are indicated, because they equalize nervous function and tend to restore the proper tone to the arteries and veins through the vaso-motor nerves, and to allay the general nervous excitability.

Probably there never was a case of pulpitis that would not yield, temporarily at least, to a vesicant at the back of the neck, acting as a counterirritant, a hot foot-bath for thirty minutes, and twenty to forty grains of bromide of potash. Such drastic measures are not, however, often called for; milder means will usually suffice.

Any of the preceding measures may be resorted to in cases in which there is no actual or threatened exposure of the pulp through progressive causes, or by accident. Where there is a large cavity of decay, it must, first of all, be thoroughly opened up, and all debris and foreign substances removed as carefully and as thoroughly as possible. It should next be washed out with tepid water, in which a little salt has been dissolved, by ejecting the stream from a mouth-syringe. The cavity should be dried out, and a pledget of cotton dipped in oil of cloves, or dilute creosote, or hamamelis inserted, this to be carefully sealed up without any pressure, by means of gutta-percha, or a pledget of cotton dipped in chloro-percha. A solution of sandarac, in which to dip the cotton, should never be employed, because it insecurely seals it, and because it very soon decomposes, leaving the cavity in a worse state than its first.

If there be actual exposure of the pulp tissue, after the careful cleaning and washing out of the cavity, the rubber dam should be applied, the cavity dried out by means of hot air, and the pulp and cavity walls sterilized by the application of mercuric chlorid, solution 1 to 2000, or some other effective germicide. If there be considerable congestion, a pledget of cotton dipped in the following may be carefully placed over the point of exposure and sealed up:

℞	Plumbi acetatis	grs. v.
	Tinct. opii	ʒ ss.
	Aquæ	℥ j.

This should be allowed to remain some hours, when it may be changed for a dressing of dilute oil of cloves, or of cassia. All pain will usually cease with the application of the lead water.

When more active measures are demanded, the following dressing may be applied after the sterilization:

℞ Atrophia sulph. ---------------------grs. j.
Aquæ dest.-----------------------℥ j.

If there shall be bleeding, and the exudation of serum from the exposed pulp, it may be dressed with a solution of tincture iodin and persulphate of iron, in equal parts. Tincture opii may sometimes be necessary for the purpose of soothing the disturbed tissue.

The inflammation and congestion once relieved, the necessary operative measures for the further preservation of the tooth may be instituted. If there is no actual pulp exposure, these may, if skilfully executed, be confidently relied upon to serve their full purpose. If, however, any portion of the pulp tissue shall be really uncovered, the prognosis will not be as favorable. In the earlier stages of inflammation, before there is any exudation from the blood-vessels of the pulp, the best results may be predicted.

If there has been extravasation of the contents of the blood channels into the body of the pulp, absorption cannot be expected, owing to the absence of lymphatics and breaking down of tissue, or death of the pulp will probably result. If the symptomatology here given is carefully studied, and habits of observation are cultivated, the determination of the inception of the degeneration process will not be a difficult matter, the prognosis will be readily made, and the advisability of either pulp-capping or devitalization may be unhesitatingly decided upon.

PYORRHEA ALVEOLARIS.

Stomatological Gazette.

In treating this disease, Dr. Cool says one treatment, as follows, will cure a large majority of cases: Anesthetize the gums; thoroughly remove all deposits, if possible; if any are left, dissolve with lactic acid; use as a wash one per cent. solution of trikresol; apply resorcin to produce adhesive inflammation; pack large pockets with iodoform gauze.

TO OVERCOME ACID CONDITIONS IN PYORRHEA.

DR. W. X. SUDDUTH.

The writer says great benefit may be derived from the internal administration of a teaspoonful before meals of

℞	Infusum columbe	ʒ iv.
	Liquor potassa	ʒ ss.

If the urine indicates a general acidity of the system, give cream-of-tartar lemonade as follows: Cream-of-tartar dissolved in boiling water, 1 to 18; add lemon juice and sweeten to taste. Use freely till the saliva loses its ropy character.

PYORRHEA ALVEOLARIS.

Dental Cosmos, August.

Dr. W. J. Younger strongly advocates the disease to be a pericemental trouble, with deposits of calculus. Devoting much attention and time to the treatment of this disease, with his declaration of much success, it is well to repeat his treatment. The first step in the treatment is to carefully remove every particle of the calcareous deposit, avoiding wounding the gum, then make an application which will bring about a union between the gum and the tooth. Iodin will not do this, and should not be used except on the outside of the gum. Lactic acid will cause the union to take place. It should be injected into the pocket. He claims to be able to cure twenty-four out of every twenty-five cases by this treatment. It takes a very delicate sense of touch in the fingers to be sure that there is no deposit left. He spoke of a case shown him by a member of the Stomatological Club of San Francisco. This gentleman said he had removed every particle of deposit, but still the pus flowed freely. Dr. Younger examined it, and found tartar still in the pockets, and told the dentist to remove this and treat it according to his directions, and it would be cured. He reported two weeks after that all the teeth were cured except one, which he said was a dead tooth. Upon making an examination, tartar was found, but the dentist could not be made to feel it. Dr. Younger, however, removed it, and the tooth was cured. His method of using the acid is to warm it slightly, which makes it more fluid and lessens the pain which the application of cold acid would cause, and with a platinum-pointed syringe inject it, placing the point of the syringe clear to the bottom of the pocket and withdrawing it as the acid is injected, so as to avoid pressure. One application is all that is necessary. The outside of the gum should be protected from the acid by an application of vaselin and a barrier of cotton. Usually after the acid has been injected it will be found there has been an exfoliation of the pocket, and the next day the gum will be found clinging close to the root. If the union is perfect nothing more is done. If it is not perfectly united, see if any more calcareous deposit exists and repeat the lactic acid. Then keep the mouth aseptic. Treat one tooth at a time; when all have been treated, the condition will be cured and will not return. Do not wash out the acid. One dentist who came to him for counsel carried out the treatment faithfully, but after applying the acid, washed it carefully out again, and of course failed.

ZINC SULPHATE AND WAX IN PYORRHEA ALVEOLARIS.

Dominion Dental Journal.

Use zinc sulphate in the treatment of pyorrhea, after thoroughly cleansing of pocket and roots. Warm beeswax in water and incorporate zinc sulphate to form a paste, with which pack the pockets and leave several days. As the pockets fill in with granulation from the bottom the plug is forced out.

PYORRHEA ALVEOLARIS, TREATMENT.

DR. A. C. HUGENSCHMIDT, PARIS.

Dental Cosmos, November.

The writer, after quoting many authors, says, the most important therapeutic consideration in this disease is the local treatment, yet one must not exclude the general treatment, which in certain cases is of very great help.

This affection is an alveolar infection, identical with the pathological process of osteomyelitis, alveolar infection of staphylococcial origin, developing, on a predisposed ground, the arthritic diathesis.

The disease begins by gingival inflammation, then periostitis of the alveolar crest; finally, when the periosteum covering the crest of the alveolus is destroyed and the osseous tissue open to infection, alveolitis, with concomitant periostitis of both the periosteum of the external surface of the alveolus, as well of the periosteum of the internal surface or dental ligament.

Considering the above mentioned lesions, what is to be done? First, to remove radically the tartar as well as the infected alveolus, with the infected neighboring tissues, and finally completing the operation by an energetic disinfection of the operative field.

The first indication is the removal of the tartar. This operation, which is considered at first sight as a very easy one, we consider, after sixteen years' practice, as one of the most minute and difficult operations made in the oral cavity. We do not speak, of course, of the removal of the apparent tartar, but of the invisible form of the calculus which can ascend or descend as far as the apex of the tooth, granular tartar which progressively invades the pericementum, while the alveolus infects itself and melts before it, until the tooth falls. It is, then, this invisible calculus, this tartar which can be semi-solid, and which is often found in microscopical quantities, which must be removed. To perform this operation special instruments are necessary. Those which we have found best adapted are those of Cushing, of Chicago.

The removal of the sub-gingival tartar, to be perfect, must be made not only with instruments necessitating a movement of traction toward the operator, but principally with those indicated above which necessitate a pressure toward the apex. After a short time one can feel very readily, through the intermediary of the instrument, the slightest rugosity on the surface of the root, and this must be carefully removed.

It is especially on the approximal or lateral surfaces of the roots of the teeth that the hardest and most difficult tartar to remove is found, and it is the one which is most often forgotten. Often one believes he has completely cleansed the surface of a root, anteriorly and posteriorly, and yet supuration continues. In this case, if one searches on the sides of the root, being careful beforehand to introduce a pellet of cotton for a few minutes between the gum and the root, to expose that region, one is surprised to find a small mass of tartar, which when removed suppresses all suppuration. It is especially for this lateral tartar that the thin instruments of Cushing are useful.

As soon as minute particles of tartar have been detached it is wise to immediately wash out the cavity left with peroxid of hydrogen, not so much for its antiseptic properties, but above all for its bubbling action, which brings to the surface the least particle of detached tartar, which, if left in the cavity, would furnish the point of departure of a new calculus, and, consequently, of a new alveolar infection.

As soon as the tartar is removed, and the gum-pockets well washed out with hydrogen dioxid, curetting of the alveolar borders must be resorted to and performed with the same instruments as above, passing all around the tooth if the gum detachment is generalized, or only on one of its faces if the external or internal surface is normal. This alveolar curetting is really only the scraping of the alveolus recommended by Riggs before even the introduction of the infectious theories.

In the great majority of cases we do not use cocain, as the patient experiences no pain, the pain appearing being an indication that the normal or least invaded part is reached. After having washed several times with peroxid of hydrogen, use as cauterizing agent pure concentrated sulphuric acid.

After having well dried the gingival pocket where curetting has been performed, dip a platinum wire the size of a small nerve broach into the glass containing the sulphuric acid, and introduce the wire so charged between the gum and root as far as it will go without force. If the infection is great, one must not hesitate to make two or three applications of the acid in the same manner. The parts are then syringed with bicarbonate of soda solution. Each gum pocket is treated in the same manner, and the patient is sent away for a few days. An important point: to cauterize the gum of the lower jaw the patient is maintained in the sitting posture, while to cauterize the peridental spaces of the superior teeth the patient must be thrown backward, the head being placed in forced extension, so that the apex of the pockets is on a lower level than the neck of the tooth, and the drug can reach to the bottom of the cavity.

At the second sitting, if the pockets have been well curetted and cauterized, a great change in the local state will be observed; around a great many teeth the suppuration will have completely disappeared, and teeth which were very shaky become much firmer.

If the gum-pockets are deep, and if a great number of teeth are invaded, several sittings may be necessary; but the operator, as well as the patient himself, has the satisfaction every time of noting a great amelioration in the local state of affairs, until the complete disappearance of pus and all inflammatory phenomena.

It is evident that, when the whole alveolar wall has disappeared, one cannot expect to reproduce it; but even in these cases repeated application of sulphuric acid at long intervals, by producing a cicatricial tissue in these gum-pockets, brings on a cicatricial contraction and a firmer implantation of the tooth.

It has been tried in the United States, and we have done it ourself, to fill up certain considerable loss of substance, by filling up the gap with sterilized sponge. Unfortunately the oral cavity is a septic ground, and when the bacteria penetrate into the sponge, all the arts which serve to defend the mouth against the invading microbe cannot act, and the sponge becomes a source of infection, which is not the case when the sterilized sponge is used to fill up certain cavities left after the extirpation of neoplasms in other regions of the organism, which can be maintained in an aseptic state.

Several objections can be made to the use of pure sulphuric acid. One can say that this acid, being a very energetic acid, can act much beyond what is expected from it and produce great loss of substance. This could be, if one employed a large quantity of this drug.

Another objection. Pure sulphuric acid being so strong can attack the tooth-substance very readily. This, however, is not the case, and pure acid attacks the tooth-substance much less rapidly than the diluted acid, such as the aromatic, which has the strength of one-tenth. We have treated several rare cases of pyorrhea alveolaris, in arthritics with cutaneous diseases, who very frequently have a recurrence of their pyorrhea corresponding with a renewal of activity of their cutaneous lesions. In one case in particular, which has been followed for six years, and where the teeth have been preserved on account of frequent cauterization, there does not exist the least trace of attack of the tooth by the acid, nor any dental caries.

One can also object that the acid renders the neck of the tooth very sensitive to heat and cold—to extremes of temperature.

Clinical observation has shown me that patients do not complain more of extremes of temperature than they do after removal of the tartar. Here, again, concentration of the acid plays an important part. The pure monohydrated acid introduced into the gum-pockets destroys rapidly the organic substances, not excepting the dentinal fibrillæ or nervous terminations which it may reach, yet does not destroy the inorganic tissues. On the other hand, diluted acid does not attack the organic tissues, but acts energetically on the osseous salts, so exposing the dentinal fibrillæ without destroying them, hence increasing the dentinal sensibility.

In any way, by introducing the acid as we have indicated it, one can very well cauterize the parts situated in the gum-pockets only without touching the neck of the tooth. We shall even add that in certain cases of extreme sensibility of the neck of the teeth, as is often present in pyorrhea where we have employed this treatment, the sensibility has greatly diminished and even completely disappeared.

In any case the important point is to carefully cauterize the crest of the infected alveolus, where the acid is expected to act, not only as a destroyer of still infected tissues, but also as an energetic antiseptic, and even as a decalcifier of small particles of tartar which would be forgotten in these pockets.

The tartar having been carefully removed and the gums cauterized with care, one must insist on the patient following strictly the hygiene of the mouth. Twice a day at least, morning and evening, the teeth must be brushed with an antiseptic powder, more or less strong, according to the quality or rapidity of formation of the tartar.

If the tartar is present in small quantity, we recommend the following formula:

Saccharin	0.20 centigram.
Menthol	1 gram.
Boric acid	2 grams.
Salol	4 grams.
Soap	10 grams.
Carbonate of lime,	
Carbonate of magnesia aa	20 grams.
Essence of peppermint	1 gram.

M.

If the patient has a great deal of tartar and cleanses his teeth with difficulty, we advise the addition to the above powder of five or ten grams of pumice powder.

The teeth being well cleansed, one must twice a day, morning and evening, resort to massage of the gums, two minutes at least each time. This massage must not be performed with the brush, but with the index finger. With the brush, patients find the process too painful and do it very imperfectly, while with the index finger they can use friction very energetically on the gums, both upper and lower, inside and outside the arch. Massage stimulates the circulation of the gums and replaces imperfect mastication; for we know that all patients suffering from pyorrhea fear to use their teeth—they do not masticate any more, take the least possible solid food, no crust of bread, no hard food. It is the contrary that we must recommend to our patients; they must masticate as much as possible, eat crust, chew even a neutral hard substance, chewing-gum, etc.

After the massage the patient must take antiseptic mouth-baths, with determined antiseptic solutions, which is a very important part of the preventive treatment.

During the course of the active treatment the patient must take three mouth-baths of five minutes each—one after each meal. Later on two will be sufficient—one in the morning, the other in the evening. On these prescriptions one must never put mouth-washes, for in these cases patients only keep the antiseptic solution, at the utmost, thirty seconds in the mouth, which is absolutely insufficient for any serious effect; for we must not forget that the strongest antiseptic, such as the bichlorid 1-1000, necessitates at least two minutes of presence in the mouth to be effectual.

On our prescriptions we always put mouth-baths of five minutes each, by the watch, and we explain to the patient that it is absolutely necessary that such be the case; that is that the antiseptic solution be continuously in contact with the mouth for at least from five to ten minutes. We recommend particularly the solutions of carbolic acid 1-100, and solutions of chloral hydrate 1-100. After fifteen days the one half per cent. solutions are sufficient.

PYORRHEA ALVEOLARIS TREATMENT.

DR. E. S. TALBOT, CHICAGO.

Dental Cosmos, August.

The writer believes the disease due to local atheromatous degeneration, aside from those cases caused by local irritation, such as infection, abrasion from clamp, plate-bridge, etc. In detailing his treatment, he says:

Admitting that the first symptoms of pyorrhea are simple inflammation of the gums, recognized by their bleeding, after removing all foreign substances, the use of a medium stiff brush and an astringent mouth-wash stimulates the gum; continue this treatment until they are hard and do not bleed, and keep them so. There is the secret of the whole situation, and the first point in treatment; the longer we wait, and the longer the disease progresses from one stage to another, the more difficult the treatment, and the less assurance of success. If chronic inflammation of the gum has extended to the peridental membrane and pus infection has ensued, scarify or mutilate the gums in removing the deposits so as to remove as much blood as possible; afterward saturate the gum with the officinal tincture of iodin. This treatment should be kept up two or three times per week until the gums are hard and tight about the teeth—the second point in treatment. Care being taken to remove all foreign matter and accumulation, in cases where calcic deposits have taken place, we must not forget that inflammation of the membrane and pus infection has preceded it. The deposit being the result, we must therefore be careful not to injure the membrane in removing it—the third point in treatment. We must not carry the instrument toward the apex of the root, thus wounding the membrane, but very gently carry the instrument beyond the deposits, and draw it away from the raw edge of the membrane. By removing the deposit we must not flatter ourselves that we have removed the cause, and therefore the disease will take care of itself. There is beyond this deposit, and even beyond the parts of degeneration and liquefaction of the membrane, a diseased connective tissue which cannot be reached by local treatment, and in such cases we must disinfect the parts with germicides and antiseptics—the fourth point in treatment. Constitutional treatment in the form of tonics is here indicated to restore the membrane to a healthy condition—the fifth point in treatment. In most cases it is useless to expect to cure a peridental membrane after the tooth has become loose in the socket, and therefore should be extracted—the sixth point. The inflammatory cells have penetrated the lymph and blood-streams throughout the entire length of the root, hence the difficulty in reaching them. The margin of the alveolar process should not be cut away except to reach the edges of the peridental membrane with the drugs. The main points to consider in such cases are to disinfect the space between the root and alveolar process, including the edges of the peridental membrane, and contract the gum tightly about the necks of the teeth to prevent the accumulation of foreign matter and pus-infection. Have used the officinal preparation of tincture of iodin with success as above mentioned, and know nothing better. Pyorrhea due to trophic changes, as observed in locomotor ataxia, paretic dementia, spinal injuries, and all defects in neurotics, must be treated constitutionally as the case may require.”

SEDATIVE FOR DENTAL PATIENTS.

DR. A. W. HARLAN, CHICAGO.

Dental Review, May.

Dr. Harlan reports remarkable success in allaying nervousness of patients undergoing dental operations, by using fluid extract Jamaica dogwood. Fifteen minims in water are given; one dose is sufficient. The time after giving the dose before operating is about ten minutes. The effect of the drug will last as long as two hours. After repeated trials, he is satisfied that we have in Jamaica dogwood an agent that will not injuriously affect the stomach or brain; no more than a drowsy feeling is produced after the lapse of fifteen minutes. This passes away in about two hours. The appetite is lost for the succeeding meal. In most cases, fifteen minutes after the dose, a ligature can be painlessly tied around the neck of a tooth.

Applied locally, the effect is beneficial, but it sticks to the cavity and is not easily removed. The remedy is excellent for hysterical patients.

Any drug, to be effective, must be pure. Send to the manufacturers, Park, Davis & Co., if it cannot be had at home, fresh and good.

WASH FOR STOMATITIS.

M. MELANGEZ.

Dental Record, November.

For stomatitis, ulceration, etc.

℞	Pot. chlor.	grs. cl
	Aqua dest.	℥ xii
	Mel. rosæ	grs. cl
	Acidi hydrochlor.	m xxx

SYPHILIS TRANSMITTED.

DR. CHAS. M. WHITNEY, BOSTON.

International Dental Journal, November.

From a very interesting and instructive article, the following abstract is made: The writer says for more than four centuries there has been in existence a destructive and dangerous disease, characterized by appearances more varied and results more disasterous than almost any other with which we are acquainted. In many cases the disease is innocently acquired, and it is to this particular portion of the subject that he especially calls attention to.

In order that it may be understood by what means this innocent transmission takes place it is necessary to call attention to certain points in the natural history of the disease as it ordinarily manifests itself, and to consider by what means this danger can be avoided. Syphilis, by one not familiar with its wonderfully varied appearance, is frequently pictured as a disease accompanied by loathsome eruptions, by facial or bodily deformities so distinct that any one could recognize them, and therefore could avoid any danger of contamination for this reason alone; by a condition, in short, like that of leprosy, both repulsive and hideous. If such were the fact, it would add much to the safety of the community, but it is not, for, in many instances the disease, from its onset to its conclusion, may be so mild that any one but a trained observer may overlook some of its most apparent symptoms. Syphilis, however, in spite of the variety of symptoms in its later stages, has at its onset tolerably well-defined laws of development.

It is a disease requiring for its origin inoculation of the virus from some pre-existing case upon a denuded surface, either epithelial or mucous. Wherever this inoculation occurs an absorption of the poison results by means of the lymphatic vessels, and the beginning of the first stage of the disease takes place. This primary inoculation does not require a large denuded surface; a minute opening no larger than a pin-point serves quite as well as a larger one, and it may be quite invisible to close inspection, and much more dangerous because so easily overlooked.

Inoculation, then, having occurred, one of two things happens;

the point of entrance of the poison may heal, to reappear later, or it may slowly increase in size. In either case we have at the end of a period of about three weeks a local ulcer of varying size and appearance, the initial lesion of syphilis, commonly called the chancre. This apparently local sore exhibits wide variation in appearance, depending partly upon the size of the original abrasion and partly also upon the locality affected. Upon the finger a common situation is at the base of the nail, and there may be a reddened, swollen ulcer, with a slight watery discharge, upon the lip; however, where the tissues are soft, a thickening or induration occurs about the primary lesion, so that we have a hard, usually painless tumor, varying in size from a pea to a large cherry. When present, this induration, which is due to a development of granulation tissue, is extremely characteristic of syphilis, and upon mucous surfaces is rarely absent. As the lymphatic vessels slowly carry away the poison, it is stored up, we may say, in the glands nearest, and these enlarge. Thus, in the case of infection upon the lip, we look for an enlargement of the submaxillary gland upon the affected side. In infection upon the finger, a small gland above the elbow is enlarged.

Introduction of the specific poison into the system through a denuded surface, a period of delay or incubation, and the appearance of a local sore with enlarged glands in the vicinity, mark, then, the first or initial stage of syphilis.

However obscure or slight the initial lesion may be, it is always present, for by this and by no other means—save in infants by heredity—can the disease be acquired. Not rarely the nature of these extra-genital lesions is not recognized; the later manifestations are mistaken for other skin-diseases, and, being untreated, in later years we have the long train of suffering and deformity consequent upon untreated syphilis. Counting, then, three weeks for the first period of incubation, we come to a second and longer period of delay before further constitutional symptoms make their appearance. This usually occupies six weeks, during which the morbid process is apparently at a standstill save for a slight increase in local symptoms and greater adjacent glandular enlargement. At the expiration of this period we have other symptoms, constitutional in character, which usher in the second stage of the disease. The first of these to appear is an eruption upon the skin, consisting of rose-colored spots, scattered thickly over the body, resembling somewhat the eruption of measles. At about the same time the throat becomes sore and presents a reddened area, usually limited to the fauces, or extending forward to the junction of the hard and soft palate, where it is sharply limited. Later, there appear the mucous patches, which constitute the first and most important symptom of syphilis in its relation to the practice of dentistry, and to which attention more in detail will be called. With these symptoms we usually find more or less headache, occasionally feverish sensations, and feelings of general discomfort. The glands of the body generally enlarge, the hair upon the scalp and eyebrows may loosen and fall, and the original eruption may become scaly, or otherwise altered in character.

Under appropriate treatment these symptoms disappear, the skin eruption gradually fades, leaving little or no trace of its presence, and the second stage of the disease is passed.

From this time the disease maifests no regularity of course, and save for an occasional mucous patch in the mouth there may be nothing to mark its presence in the system. Sooner or later, however, in untreated cases, the symptoms of the tertiary stage appear, and here for the first time we find evidence of the destructive and terrible nature of the disease. The limits of this paper will not allow more than a brief touch upon these, but it will suffice to say that no organ or structure is safe from its ravages. Its possibilities untreated are appalling.

Admitting, then, the possibilities of syphilis, what especial interest have they for the dentist, whose professional attention is directed to the mouth, and not to the eyes or throat, to the skin or bones, to the brain or other visceral organs?

A most important relation indeed, for it is the mouth lesions of syphilis which are the most potent agents in its innocent transmission,—by far the most important because the least understood, and therefore not guarded against. Until within a few years this subject has received but little attention. Occasional cases have been reported of mouth infection, and every physician has been aware of these dangers; but the patient, but little instructed regarding its precise nature, has inoculated innocent persons, and these again others, and thus the vicious circle has widened.

What form, then, does syphilis take in the mouth that we should fear it so greatly, and that contamination should so frequently result?

At the time of the secondary symptoms there appear various changes in the mouth and throat, to only one of which I wish especially to call attention,—the mucous patch, as it is termed. Analogous to the rose-spots upon the skin, modified only by the different structure of the lining of the mouth, there appear white spots of various sizes, situated upon the inner surface of the lips, especially where they are brought in contact with an irritating point like a decayed tooth, along the sides of the tongue, upon the tonsils and roof of the mouth. Making their first appearance then, they are the most frequent of any of the symptoms of the disease, and constantly reappear during its course whether treated or not. Their size is variable, and they are only moderately sensitive. They are covered with a whitish, opaline film, which gives them the appearance of having been touched with caustic.

They are not unlike the frequent and harmless "canker spots," and very often cannot be distinguished from them. The chief points of difference are that the canker spots are more of an inflammatory type, yellowish spots with a reddish circumference, and they are much more sensitive.

Besides these most common and dangerous manifestations of syphilis in the mouth, we have other and later symptoms. Deep ulcerations may occur upon the mucous membranes, with destruction of tissue and deep scars. Gummata, which occur as a late symptom in various parts of the body, occur in the mouth and throat, and consist in one or two small, hard tumors, which very rapidly degenerate, leaving an open ulcer, and when they occur upon the palate or roof of the mouth very frequently perforate the tissues separating the mouth and nose, and a very troublesome condition results, requiring the aid of the dentist in many instances. The early symptoms already described are the most dangerous to the dentist, for it must not be forgotten that not alone are the spots themselves contagious, but the saliva also, and may convey the poison to any part which it touches. How important, then, for the dentist to use proper care in these mouths, with his fingers constantly bathed in a solution of syphilis, if I may be allowed the phrase !

How shall the dentist, if a patient presents himself with spots in the mouth, distinguish the harmless from the dangerous form ?

Bearing in mind the other symptoms most common, it is well to look for any swelling of the glands behind the ears, for loss of hair or eyebrows, for crusts upon the scalp, and scars of other ulcerations in the mouth, especially at the corners. These may be all absent, and I do not hesitate to say that whenever any whitish spots are seen in the mouth of a patient, they should be viewed with suspicion, and proper measures for protection taken in every case, whether further evidences of syphilis be present or not· Furthermore, it seems to me to be the obvious duty of every physician having a case of syphilis under his care to advise the patient to refrain from having any dental work done until the contagious stage is passed, or, at any rate, until all local signs have disappeared from the mouth. Remembering, then, that syphilis in a most contagious form may exist in the mouth, and show nowhere else evidence of its presence, we can readily understand that the disease may be innocently acquired or transmitted in two ways,—either by direct contact or by the deposition of the saliva or virus from any lesion upon any object which may be brought in contact with a denuded surface.

In considering the possibility of infection by indirect means we cannot but be amazed at the variety of ways in which this is brought about. Any article upon which can be deposited the diseased virus can produce this effect, and we find instances in almost all occupations. The glass-blower, passing the tube from mouth to mouth ; the musician, using the flute or cornet ; the shoemaker, whose mouth is filled with pegs, to be thrown down and used by an uninfected individual ; the artisan, with the blowpipe, have all been the means of infecting their especial implements, through which others have become infected. The pencil, wet in the mouth of one infected, spreads the disease to the innocent.

Admitting, then, these dangers, how shall they be avoided ? By what means shall the dentist avoid inoculation himself, or prevent a possible infection of his patient? As regards the first, careful inspection of the fingers, especially about the roots of the nail, the site of the common "hang-hail," as it is termed. Every abrasion should be thoroughly brushed with contractile collodion. Should any escape observation in working upon such a case, the spot should be thoroughly washed with soap and water and touched with one per cent. solution of corrosive sublimate or pure carbolic acid.

As regards the second possibility, all instruments should be frequently and thoroughly cleansed, and after working upon such a case, should be sterilized by boiling water, to which has been added one per cent. washing soda (a tablespoonful to a pint) to prevent rusting of the instruments. If I were to select any special instrument deserving care, I should select the mouth-mirror, which cannot be sterilized or rendered antiseptic by chemical means. In such cases an individual mirror should always be used.

The mouthpiece used in administering gas should be very carefully watched and kept absolutely clean. Instruments may be rendered fairly safe by immersion in two per cent. creolin solution, or pure carbolic acid. By such precaution much of the danger to the dentist can be averted, and so unfortunate a circumstance as infecting a patient can be avoided.

SILVER SUTURE WIRE FOR LIGATING TEETH.

It is claimed that the use of silver wire is better than gold or other kinds of wire for ligating teeth in treating Riggs' disease. It has anti-bacterial qualities. They will not grow on it.

TO PROTECT TEETH FROM ACID.

Dental Review, December.

The compound stearate of zinc may be used to protect the teeth from the action of acid

FOR SORE TONGUE.

Dental Review, November.

Dr. Harlan says, for soreness of the sides of the tongue and the pharynx use about 5 per cent. loretin in water—warm water. Use it two or three times daily.

TOOTHACHE.

Dental Review, December.

Bicarbonate of soda will often cure toothache, caused by exposed pulp.

TOOTHACHE REMEDY.

Items of Interest, July.

Dr. J. Van Pelt Wicks says that carbolized rosin prepared as follows, is almost a specific for toothache from exposed pulp:

℞	Pulverized rosin	ʒ iv.
	Carbolic acid (95 per cent.)	ʒ jii.
	Chloroform	ʒ ji.

M.

TO RELIEVE TOOTHACHE.

DR. A. W. HARLAN.

Wash the cavity with pyrozone, 3 per cent., dry quickly and apply chloroform, followed by melted carbolic acid.

LIQUID VASELIN.

Dental Review, December.

This is a clear, limpid, almost tasteless fluid, about the consistency of sweet milk, and is a ready solvent of many alkaloids for hypodermic use. It may be used as an external dressing to cover medicines placed in pulpless teeth when there is acute apical pericementitis.

WASH AFTER TOOTH EXTRACTION.

M. ROSEY.

Dental Record, November.

℞	Acidi boraci	ʒ 1½
	Glycerini	ʒ 3½
	Aquæ dest.	ʒ 35
	Ess. mentha. pip. or Rosæ	gt. 9

Mix with equal parts warm water.

WASH FOR THOSE WEARING ARTIFICIAL PLATES.

M. LOEWE.

Dental Record, November.

℞	Alcohol	ʒ 1¾
	Tinct. krameria	m 150
	Thymol	grs. 7
	Ess. oil of thyme	m 7

Add water, quantity sufficient.

MOUTH WASH.

M. BOTOT.

Dental Record, November.

℞	Star anise	ʒ 2
	Canelle bark	ʒ ½
	Cloves	grs. 15
	Pyrethrum root	grs. 60
	Cochineal	grs. 70
	Cream tartar	grs. 80
	Gum myrrh	grs. 30
	Ess. peppermint (1 in 50)	gts. 60
	Alcohol	ʒ 70

MOUTH WASHES.

℞	Thymol	grs. v.
	Ac. Benzoic	ʒ ss.
	Tinct. eucalypt.	ʒ iii.
	Aquæ	O j.

Hydrarg. bichlor.	grs. iii.
Thymol	m iii.
Aq. destill.	O j.

To be used for 60 seconds.

ARNICA MOUTH WASH.

M. BOUCHUT.

Dental Record, November.

℞	Arnica floreto	ʒ 1½
	Canelle	
	Cloves	
	Ginger aa	grs. 150
	Aniseed	ʒ 3½
	Alcohol	℥ 4
	Aqua, q.s.	

BOROLYPTOL MOUTH WASH.

Southern Dental Journal, April.

Borolyptol makes a delightful, refrigerant mouth-wash in primary stomatitis; combined with myrrh and cinchona, it acts well on spongy gums.

ORAL SURGERY.

DIAGNOSTIC SIGNS OF EMPYEMA OF THE ANTRUM.

International Dental Journal, July.

Dr. F. C. Cobb, of Boston, in writting on this subject, gives the following as some of the diagnostic signs of antral trouble. He ays the first point to be looked for is the location of the discharge. If pus is seen issuing from under the middle turbinate, the diagnosis is simplified, since the frontal sinus, the anterior ethmoidal, and the antrum have their outlets in that region. The nostril should therefore be carefully cleansed and wiped dry with a pledget of cotton, and then the point of issue of the pus carefully noted. If the pus comes from under the middle turbinate, we next have to differentiate between the antrum, the frontal, and anterior ethmoidal cells. This is often a difficult matter, and many expedients have been resorted to in deciding which cavity is affected.

The presence of necrosed bone in the ethmoid region, and the location of the pain, may determine the diagnosis in favor of that cavity. If these signs are wanting, we are left to make a diagnosis between frontal and antral empyema. The location of the pain is here not absolutely reliable, for frontal pain is met with in empyema of the antrum. We may find redness or tenderness over the frontal sinus, and it is recommended to probe the sinus through its opening in the infundibulum. If this fails the anatomical exits of the sinuses may be taken advantage of for the purpose of diagnosis in the following way: As the frontal and ethmoidal have their openings at their lowest parts, while the antral opening is at its highest part, it is evident that the two first sinuses are best drained when the head is in an upright position; but the antrum, when the head is inverted. The patient is therefore directed, after his nostrils have been wiped clear of pus, to put his head between his knees, and if, after a few moments, on assuming the erect position, the nostril is found full of pus, it has probably come from the antrum. The method of transillumination by putting a small electric lamp in the mouth and darkening the room is sometimes useful. Transillumination, however, does not always give certain results, for the variation in the thickness of the walls of the antrum may be considerable, and the skin may be too thick to transmit light well. If these methods fail, recourse must be had to exploratory puncture by the lower meatus, canine fossa, or alveolar process.

ANTRUM, TREATMENT.

Pacific Dental Journal, January.

One to two per cent. of silver nitrate is effective in antral treatment.

ANTISEPTIC DOUCHE FOR ANTRAL CATARRH.

DR. E. C. KIRK, PHILADELPHIA.

Dental Cosmos. December.

In the treatment of catarrhal conditions of the antrum and nasopharynx, most satisfactory results have been obtained from the use of euthymol, listerine, or borolyptol diluted with three or four volumes of distilled water and used as an irrigating douche. Each of these preparations is temporarily irritant to the Schneiderian membrane, but the irritation may be controlled by the addition of a minute amount of cocain hydrochlorid to the fluid. The following makes an excellent preparation : Borolyptol, 1 ounce ; distilled water, 3 ounces; cocain hydrochlorid, 2 grains. The douche should be used at blood temperature. It will frequently abort an attack of acute coryza when used promptly.

It is not intended that this preparation should be used for purulent antral catarrh, for which more active antiseptic treatment is indicated, but for the class of catarrhal conditions which are the result of "taking cold," and which are likely to run a chronic course, characterized first by a dry, heated condition followed by profuse muco-serous discharge and thickening of the membrane.

TREATING THE ANTRUM.

Dr. Stellwagen often uses tincture iodin in the antrum. The tincture is dropped into the water until the fluid is decidedly colored. For certain conditions, the remedy is excellent.

IMPRESSION OF CLEFT PALATE.

DR. C. S. CASE, CHICAGO, ILL.

The Bur, October.

To obtain an impression of a cleft palate, instead of a tray use for an impression holder a piece of tin, about 6 inches long and $\frac{3}{4}$ of an inch wide; wired at the edges to give it stiffness. Sometimes a bar of lead about the same size will answer.

This is bent so as to lay along the palatal surface about $\frac{1}{8}$ or $\frac{1}{2}$ an inch below the cleft, from a point a little beyond the hard palate.

Heat the holder at one end and attach to it firmly a sufficient mass of softened modeling compound for the required extent of the impression.

With this prepare an impression tray for the final plaster impression, by first taking the impression in the compound and cutting it away—as will be described.

In selecting the amount of compound, remember an impression for an artificial denture is not to be taken, but of the cleft from its anterior apex nearly to the uvula, and only over that portion of the palatal surface inside of a "balk-line" about $\frac{1}{8}$ of an inch from the bicuspids and molars. It is well to have the compound cover the lingual surfaces of one or two incisors to serve as a guide, after the first impression, to its subsequent introductions. Posteriorly the compound should extend to the posterior borders of the velum to serve as an apron for the surplus plaster and to sustain the required portion.

In introducing the compound place the index-finger beneath and a little beyond the further extremity of the holder. When introduced, the end of the finger should rest in the cleft just above the bifurcated uvulæ and surrounded by the compound. The tendency will be with dentists who are in the habit of taking impression, but not of this kind, to force the compound and holder too high into the cleft.

Very little force is required to carry it to place if the compound has finally been made quite soft in hot water. As soon as it is in place the patient should be asked to swallow, when you will feel the uvulæ grasping the end of the finger. The impression may now be immediately removed.

Carry it only partially to place the first time, and remove it almost as soon as it is introduced. This may be repeated several times, softening each time the surface of the posterior portion, and after the introduction ask the patient to swallow. It will be guided to place each time by the impressions upon the incisors. This procedure subserves several purposes: The patient is soon relieved of all fear of that part of the operation which they have been taught to believe will be a severe ordeal; the palatal and pharyngeal muscles cease to contract upon the slightest touch,—a thing of great importance at the time of the final plaster impression; and finally, one is able to observe the shape of the cleft, accurately calculate the difficulties, and become disciplined in all the requirements of the particular case.

The impression may now be hardened in water, the finger drawn out of the socket of compound, and all surplus material cut away.

Remove all that portion which extends above the nearest approaching borders of the entire cleft, and leave the cut surface smooth. Slightly trim it over the palatal surface and freely over the surface which covers the velum, but do not trim the edge which represents the borders of the cleft. Freely cut away the sides from the molars and bicuspids, so that the teeth will not become locked in the plaster, or so surrounded as to prevent a backward movement of the impression in its removal. Finally roughen the trimmed surfaces where the plaster is to adhere. During this procedure it may be introduced from time to time to be sure that the remnants of the velum are not lifted from a relaxed position, or even touched by the compound when in position.

When an impression tray is properly prepared in this manner, there remains no future difficulties so far as a perfect impression is concerned, such as will give a model having all the requirements of practical usefulness.

Cleft palate patients as a class are nervous, diffident and hard to manage. So far you have inflicted no pain and very little discomfort. You have intelligently pursued the routine of the operation with the same quiet application to detail that would characterize your movements in any other simple operation. And what is of the greatest importance, you have gained the confidence and perfect control of your patient.

When you come to the final impression in plaster, it will not be necessary to enter into explanations, or make any more fuss about it than when introducing the trial impressions, for it will give but little more discomfort. Use sufficient plaster to fill the space between the prepared tray and palatal surface, and enough over the smooth surface in the cleft to give you the desired impression above the borders. Introduce it with that accuracy which is necessary and which you have by this time acquired, and finally in its removal carry it in the direction which you have learned to be the easiest for this particular case.

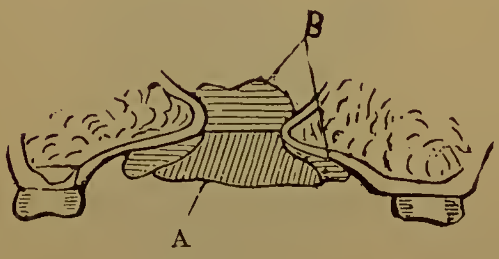


Fig. 1.

You will have no fear of its being locked in the cleft, however extensive the impression, because you will have observed that all that portion of plaster above the borders is completely cut off from the palatal portion by the compound which fits along the edges, and will readily cleave from the smooth surface if it becomes locked, remaining in the cleft where it can be easily rescued and restored to its place on the impression.

Fig. 1 represents a transverse section of such an impression in position. A is the modeling compound which touches at the borders of the cleft, and B is the plaster.

When you are ready to introduce the plaster impression have the patient sit in an upright position, with the head bowed slightly forward. This will prevent the possibility of any surplus plaster escaping into the fauces.

Fig. 2 represents a model from an impression, such as described, of a typical case of cleft palate. The model has been trimmed and shaped preparatory to forming the trial model of the artificial palate. It accurately represents the cleft through the hard parts, and all the palatal surface of the mouth that can possibly be used for the palate.

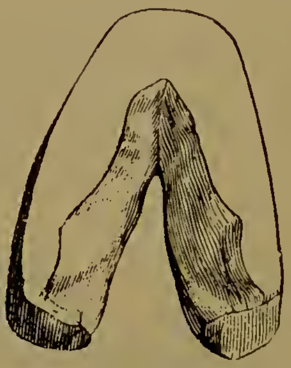


Fig. 2.

It will be seen that the model of the remnants of the velum have been freely cut away, which Dr. Kingsley says should be accurately represented in the model even to and including the uvula. Invariably cut them away: First, because it facilitates the repeated removals and replacements of the trial model of the palate while it is being shaped and fitted to the mouth; and second, because there can be no possible use for them in the model. The rounded borders of the fissure through the velum and uvula never touch the artificial palate in the relaxed position of the muscles. It is only, as in the act of swallowing, that the palate is grasped by these borders; and then only their anterior portions fall into the space that has been provided for them for this movement, between the posterior part of the lateral wings of the palatal portion and the anterior flare of the veil.

If not successful in taking a perfect impression of the anterior portion of the upper surfaces of the velum, cut these parts freely away on the model, to await the additions to be made to them when the trial model of the palate has been shaped and is finally placed on the model ready to be surrounded with plaster for the patterns that are to be duplicated in metal.

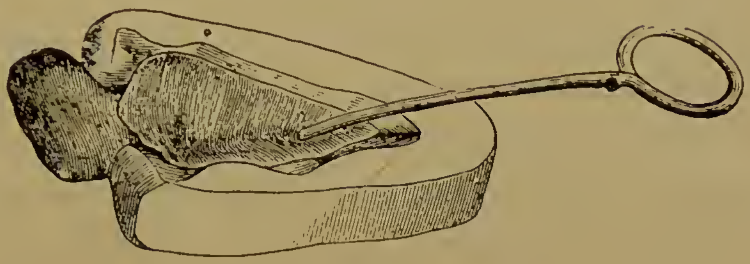


FIG. 3.

Fig. 3 represents the model of the palate formed of modeling compound and in its position on the plaster model ready to be finally shaped by repeated trials in the mouth.

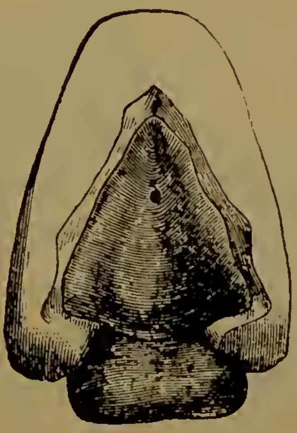


Fig. 4.

Fig. 4 is another view of the trial model in position, ready to be surrounded by the different parts in plaster which are to be duplicated in metal for the final casts in which the flexible rubber palates are to be vulcanized.

DIAGNOSTIC SIGNS OF CALCULUS IN SALIVARY DUCTS.

International Dental Journal, October.

Dr. Futterer, in writing on salivary calculi, gives some of the important diagnostic signs as follows: Most patients in eating, especially if the diet be particularly tempting, will suddenly notice a swelling in the submaxillary region. (Calculi are more frequent in this region). On resting the mouth and pressing on the swelling, it will disappear. Those in the submaxillary region are of a hard consistency, and are also to be seen and felt at the floor of the mouth between the jaw and tongue. Suppuration prepares for the expulsion of the stone, and usually comes suddenly, causing considerable swelling of the gland and surrounding parts, difficulty in swallowing and masticating.

FACIAL RESTORATION.

MR. S. BROCK AND MR. HUDSON, LONDON.

Ash's Quarterly, September.

Mr. William Veale was hit by a rock thrown by a blast, which destroyed his eyes, nose, upper lip and superior maxillary. For two days he lay apparently lifeless and his coffin was ordered for his burial. Signs of life returned, but for twenty-one days he lay unconscious. The writer says:

When he came under my notice, it seemed possible to replace the palate and teeth, and, with the aid of Mr. Hudson, the cheeks, nose and lip. Both eyes, the floor of the orbits, and the nose had disappeared; the anterior part of the superior maxillary from the second bicuspid on the left side to where the first molar should have been on the right was also missing, and likewise all the teeth with the exception of the second bicuspid and first and second molars on the left side. The second molar was, however, so extensively decayed it was extracted. There was thought to be some danger in doing this, owing to the shattered condition of the jaw, but, with the assistance of Mr. Braine, gas was administered, and the tooth successfully extracted; since then, by the way, the third molar has partially erupted.

Dr. Bland Sutton, who saw the patient at this juncture, strongly advised a further delay of six months to allow the parts to more thoroughly heal. Veale accordingly went back to St. Ives and returned in the beginning of May.

An impression of the remaining parts of the mouth was taken in beeswax, and cast a model in plaster, from which a special tray was made. With this a fresh impression and model were taken and cast, molded in sand in the ordinary way, and a gold plate was struck-up to the shape. On the posterior margin of the plate was soldered a crescent-shaped piece of plate about half an inch wide, the anterior and free edge being raised to come in line with the lingual surface of the palate. This, besides securing strength, allowed of the surface of the vulcanite being brought flush to the edge of the gold, instead of having a chamfered edge, which invariably curls up away from the plate.

Before mounting the teeth a gold-pointed tube was soldered on the anterior part of the plate to project as near as could be judged towards the center of the nose, the object of this being to connect

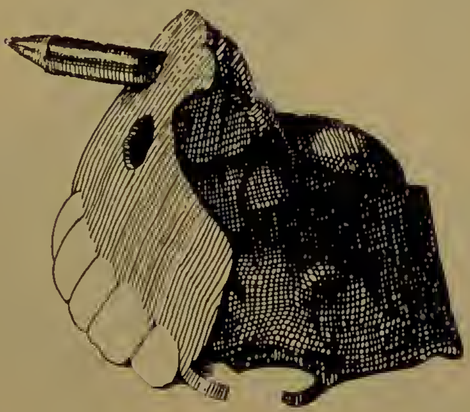


FIG. 1 shows the artificial upper denture.

the denture to the mask. The teeth were then mounted and the plate tried in for the bite, at which stage the patient spoke distinctly.

After flasking and clearing away the wax, a thin layer of rubber was packed over the surface of the gold; the outer portion with the teeth was also packed with just sufficient rubber to hold them together and to gain enough strength. The remaining part was then filled with plaster, and a tin plate, previously struck up to the shape of the palate, was placed in and the flask closed. When the plaster had set, the flask was opened, the tin plate and superfluous portions of plaster were removed, a fresh layer of rubber was placed in position, and the flask was again closed and put in the vulcanizer. After vulcanization the plaster was cleared away through two holes in the front, one on each side of the gold pin. By this arrangement the utmost lightness was obtained. (See Fig. 1.)

Mr. Hudson and myself then attempted to take a plaster cast of the disfigured face with the denture in position. We first tried oiled silk to prevent the plaster adhering to the face, etc., but this proved too unyielding, and, the mold being very imperfect, we next tried a layer of moistened tissue paper, which answered admirably. From the mold thus obtained a plaster model was cast upon which Mr. Hudson skillfully modeled up the missing portions of the face in wax. From this a plaster mold and model were taken and cast, and a zinc die made with a lead reverse. The mask is made of silver, and the three main portions (namely, the two side pieces and the center strip) are soldered together.

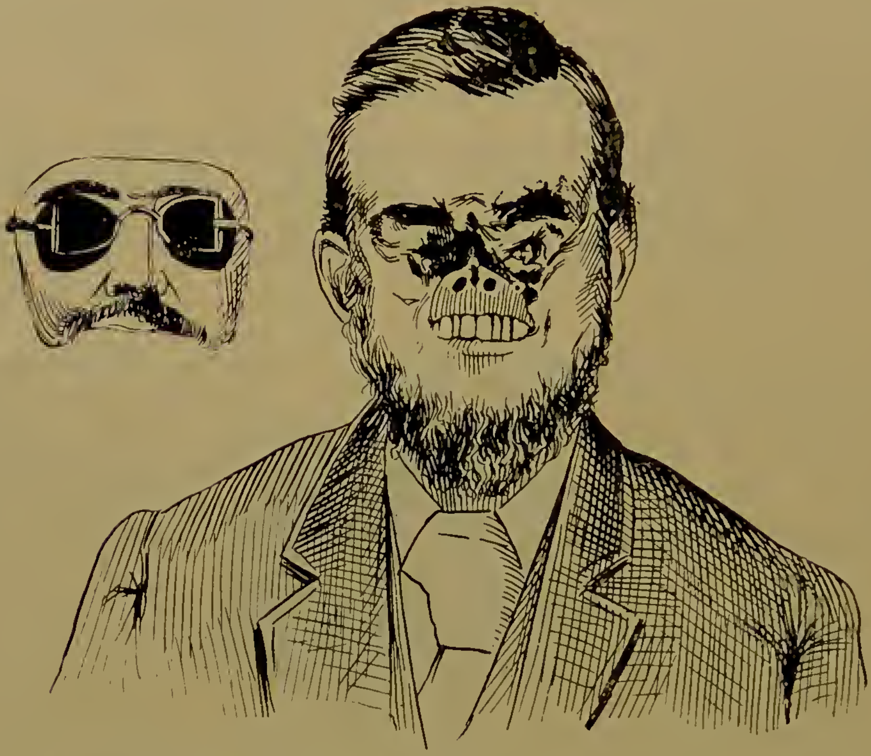


FIG. 2 shows the face with artificial upper denture in position, and the mask away from the face.

This completed the rough portion of the work. Mr. Hudson then, with much labor and artistic taste, carved the zinc model wherever undercuts were desirable, notably the inner and outer parts of the nostrils, the mask being chased into them. Two small silver tubes were then shaped and soldered into the nostrils, and all the joins carefully finished. A silver tube was made to slide over the gold pin fixed to the denture, and this was then soldered to the inner surface of the mask in the center of the nose, and strengthened in position by a piece of silver plate with a hole in the center, soldered on transversely at the back of the nose.

The upper lip is merely a piece of red rubber tubing tied at each end, and held in position by three catches soldered inside the silver lip; the rubber coming just below the edge of the silver lip allows the patient's lower lip to rest comfortably against a flexible surface. This is easily removed for cleansing purposes—in fact, several were made for the patient as a store. A strong pair of blue silver-framed goggles, with the ordinary retractor fastenings behind the head, were constructed, and a small pin was soldered to the back of the center of the bridge of the goggles; this pin fits into a hole made in the mask, thereby preventing the goggles from slipping. After this Mr. Hudson painted the mask whilst it was on the patient's face. A slight moustache and eyebrows were affixed, the patient's own whiskers being laid under contribution for the hair required for them.

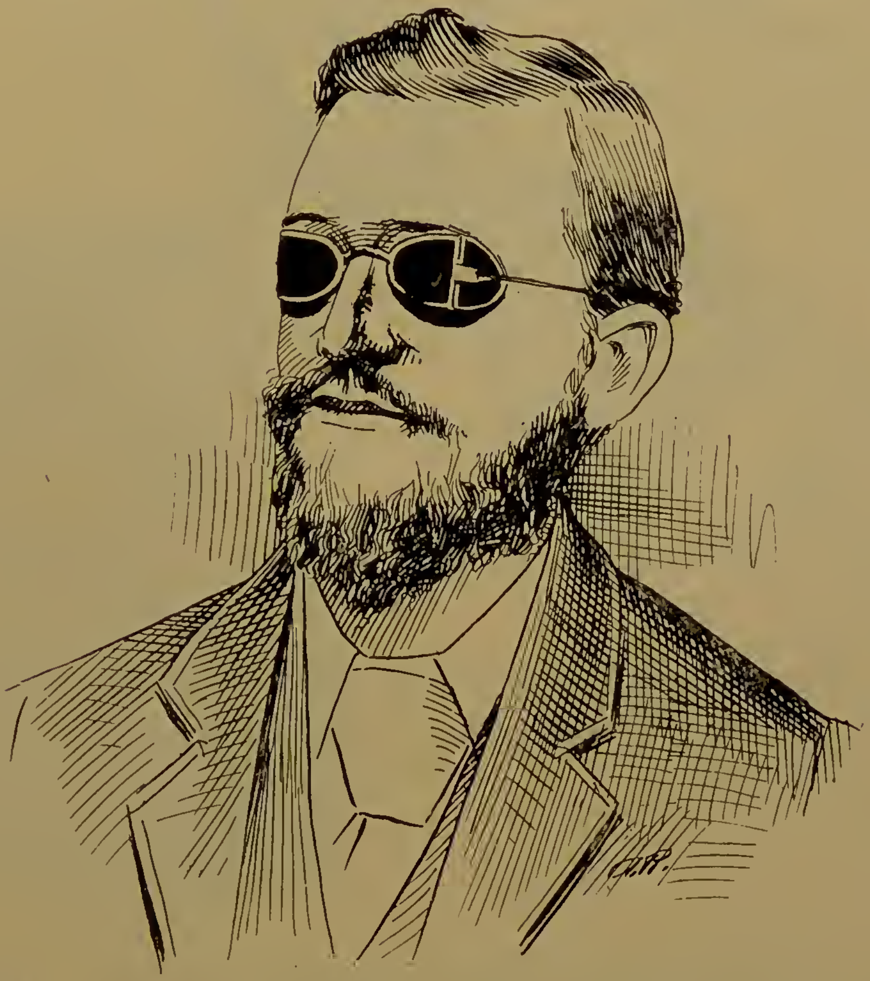
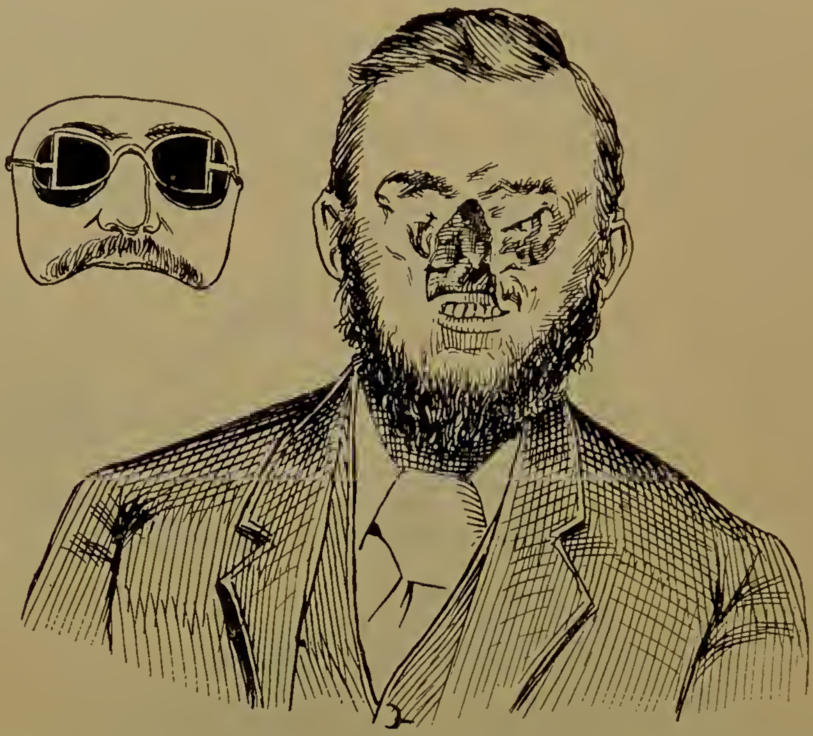


FIG. 3 shows the patient's present appearance.

Too much stress, continues Mr. Brock, cannot be laid upon the work of the artist in this case. The exterior of the mask is so skillfully modeled, and the combination of color, with its many tones of shade, imitates so admirably the natural complexion of the wearer, that a close observation of the face would be necessary to detect its artificiality.



Shows condition of the face before treatment, and the mask away from the face.

A MECHANICAL APPLIANCE FOR THE REPLACEMENT OF THE RIGHT SUPERIOR MAXILLA, THE FACE, AND A PORTION OF THE NOSE.

DR. THOMAS P. HINMAN, ATLANTA, GA.

Dental Cosmos, July.

On February 5, 1896, Mr. Levi P., of Buncombe county, N. C., was brought to my office to consult me as to the replacement of the entire right superior maxilla, a portion of the nose, and the entire hard palate. On examination found the right superior maxilla, the right nasal, the right palate, the right turbinates, and a portion of the vomer completely gone; a portion of the left palatine process, the alveolar process around to the first molar on the left, the soft palate remaining intact. No photograph can convey a correct idea of the case as it appeared. These tissues were lost by the removal of a cancerous growth about a year and a half ago, there being no recurrence of the disease, the tissue being in a perfectly healthy condition. (See Fig. 1.)

The first procedure was to get a model or an impression; I decided on the former, and accomplished it by the aid of modeling compound. I first filled the cavity with absorbent cotton, and then cut a piece of paper to approximately fit the opening; before placing this in position, covered one side with vaseline, which was intended to prevent the modeling composition from adhering to the paper.

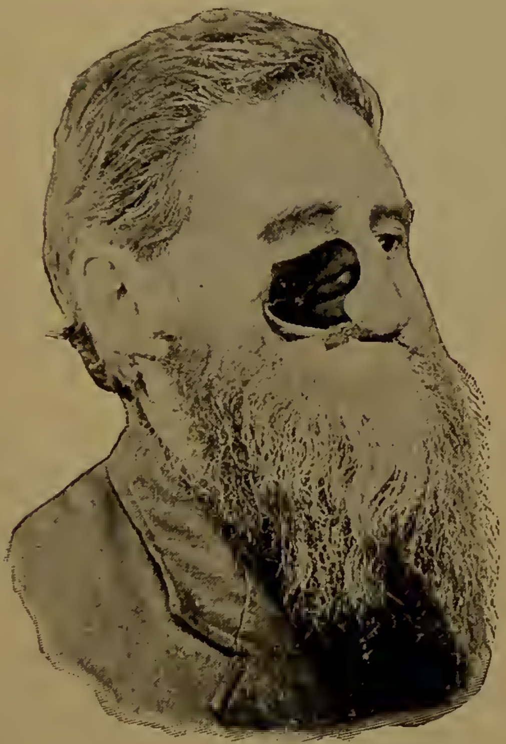


FIG. 1.

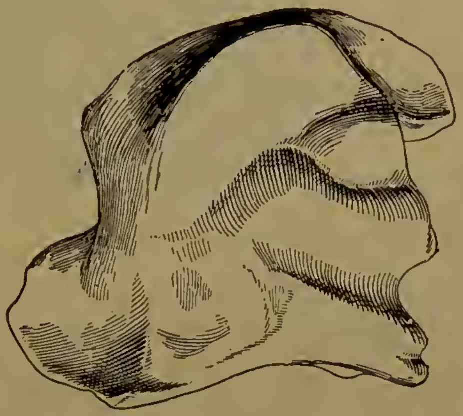


FIG. 2.

A large piece of modeling composition was then softened and placed in the part of the opening that was not filled with cotton, carefully pressing the composition to the edges of the cavity; when this hardened it formed a base on which to shape the model. This was made by adding other small pieces of composition, forming them with a hot spatula and trimming away the excess with a penknife. This required about three weeks' time, giving from one to three hours per day to the work.

The inner surface being completed, it was placed in position, and then proceeded to model the face with a large piece of modeling compound, manipulating with my fingers and afterward trimming with my knife until it matched the other side of the face. (See Fig. 2.) This model contains about one hundred pieces of modeling composition. The next thing was its reproduction in aluminum, which I decided was the best material for the purpose. Not wishing to destroy my original model, I made a piece-mold of marble-dust and plaster.

After the mold was complete it was tapped apart and the model removed; the pieces were fitted in place and bound with wire. Taking a clay crucible, I drilled a hole in the bottom and fitted in it a piece of brass tubing; this crucible was placed on the top of the piece-mold, the brass tubing fitting in a hole cut in the top of it, and the whole piece-mold was then covered with marble-dust and plaster and placed on a stove to dry out, this taking about twenty-four hours.

When dry, the crucible was removed, aluminum placed in it and melted; the crucible was then placed on the piece-mold and the aluminum blown down by the cap and tube made especially for the purpose. When cool the casting was removed from the mold, and found to be perfect in all particulars. It fitted perfectly, but proved to be too heavy, weighing six and one-half ounces. It was decided to hollow it out, which was accomplished with twist drills and a large vulcanite bur; this was done on the lathe, reducing the weight of the cast to three and one-quarter ounces, or one-half its original weight.

Roughening the facial surface, pink rubber was vulcanized on it; this was stippled with a small bur to imitate the skin.

The case was placed in the hands of an artist for coloring, which was done so nicely that the difference would not be noticed by the casual observer.

A hair-dresser made a piece of beard and moustache to fit the case on the inferior external border, so as to cover the joint; this was attached by an elastic band, and could readily be removed.

Two hooks were then placed on the superior external angles of the appliance, to which an elastic band was fastened with eyes sewed on the ends; this band going around the head furnished support, being adjustable. A silk eye-cover was fitted to the bands so as to cover the place of the lost eye, and the patient's appearance was much improved. (See Fig. 3.)

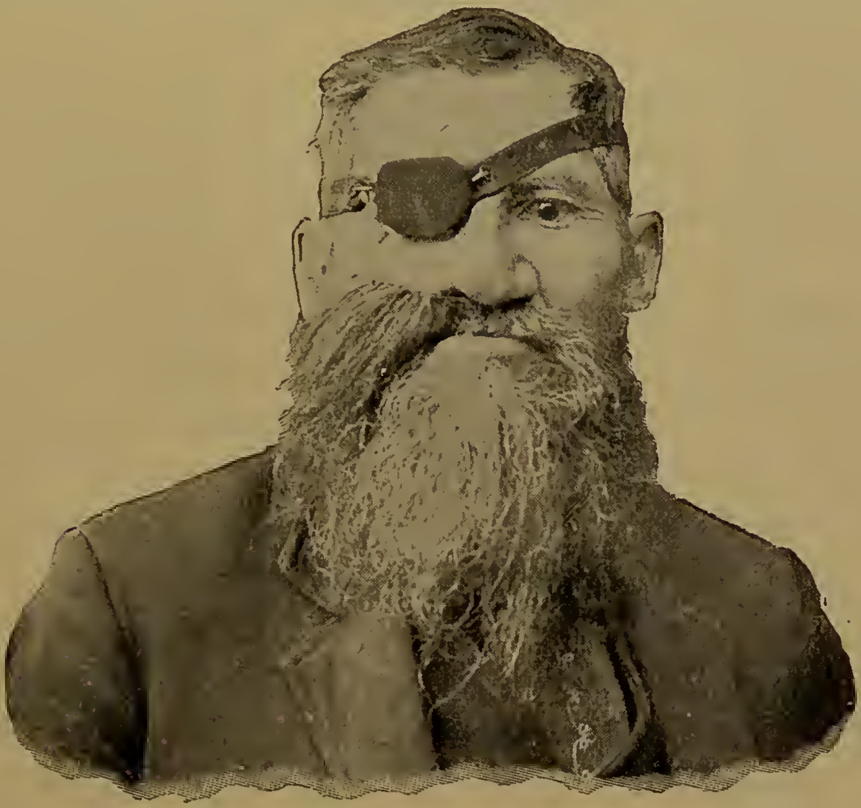


FIG. 3.

Before the introduction of the appliance the patient's speech was absolutely unintelligible to strangers, he having to carry a pad and write his communications, and even his most intimate friends could not always understand him. Immediately after the appliance was placed in position he began to talk plainly.

EARLY DIAGNOSIS, AND IN BRIEF, TREATMENT OF TUMORS OF THE JAW.

DR. H. H. SCHUHMANN, CHICAGO.

Dental Review, August.

The word tumor signifies swelling, and yet in referring to swellings usually characterized by tumors, we have in mind distinct localized growths. For a moment forget the various classifications of tumors found in general surgical literature, inasmuch as we are at the present time particularly interested in the ultimate course and destiny of these growths, and consider them from a standpoint of their malignancy or innocence.

Occurring in the jaws, it is safe to say that any tumor which by local and general disturbance can endanger life is malignant. Most text-books classify them into innocent, malignant and semi-malignant tumors. In the first class, of course, they only include such as are capable of creating none but local disturbances, where there exists for some reason an excessive growth of tissues very like that of the affected part from which they spring; for instance, there may be a localized growth of bone or osseous tissue, an osteoma of cartilage, or chondromous tissue, a chondroma, of fibrous tissue, a fibroma. These tumors imitate exactly the type of tissue from which they grow. They do not produce any serious changes in the surrounding tissues excepting by pressure and tension. They do not impress the system unfavorably any more than that they are generally annoying. By their location they may interfere with proper mastication and deglutition, but beyond this are harmless. On the other hand, there are tumors which are not content with simply occupying part of the jaw, but which dig down and grow into the surrounding tissues; not satisfied in merely crowding the tissues before them, but saturate them with their poisonous elements, invading and destroying them, and through the blood disseminate their infection, setting up infectious tumors in the lungs, the liver and other parts of the body, until the patient finally succumbs to their exhausting influence.

The term semi-malignant tumor is misleading. A growth may present itself which does not cause rapid destruction or violently invade the surrounding structures, and still the step is in that direction. It means death ultimately, but slower death. In some text-books we find cancers or carcinómas classed as malignant, and under the head of semi-malignant we find the tumor called sarcoma. Sarcoma signifies flesh, but do not think for a moment that these tumors are made up of muscle tissue. They are constituted of exactly the same kind of cells though, which go to make up muscle tissue in the embryo, what we call embryonic connective tissue cells. To consider the sarcoma for a moment: There are three varieties. One is made up of round cells, another of oat-shaped, called spindle cells, and a third is composed of irregular, very large round cells, containing in their interior a minute nucleus, called giant cells.

Despite the fact that sarcoma is called semi-malignant the round-celled is equally, if not more, malignant than carcinoma, and even the spindle celled variety may exhibit most malignant attributes, the most innocent of the three being the giant-celled. It is apparent, therefore, that in order to make the subject more clearly understood we should speak of tumors as being innocent or malignant, the degree of their malignancy being of secondary importance. One important distinction between malignant and non-malignant tumors is made evident by the result of their treatment. Innocent growths once thoroughly removed do not return. This is not so with the malignant, from which microscopic cells have already forced entrance into surrounding tissues far beyond a point apparent to the naked eye, and we will find them recurring even after the most generous removal.

Before entering the study any further it is advisable to call attention to the fact that many of these tumors find their origin in the diseased condition of the gum secondarily invading the jaws; others to the contrary are located on or possibly in the body of the bone. Occurring in these different sites their ultimate course differs widely. Owing to the different relations of the two maxillæ to surrounding parts, the greatest difference will make itself apparent in the malignancy of tumors originating in the upper or lower jaw. First consider tumors in the light of their location. The gums may be subject to a general thickening called hypertrophy, and right here you will find how deceiving some of these growths are. True hypertrophy springs from the periosteum of the alveolus proper, and while therefore but a simple enlargement may be visible the condition will yield permanently to nothing short of removal of the alveolus. This enlarged condition of the gum may occur as a limited hypertrophy due to pressure of poorly fitting artificial teeth. This is especially true in elderly people wearing such artificial dentures, for at their time of life the tissues respond quickly to any irritation.

Another instance of a tumor classified more justly as a gum tumor is found in innocent growths springing up between the teeth with very thin necks and bulbous ends. These polyps are readily removed by a wire loop of the cautery. This reminds me of some of the peculiarities in the growth of these polyps. A lady was observed during three different pregnancies; each time there appeared a series of well-defined tumors between the teeth along the whole free border of the gums, bleeding freely on the slightest irritation. These vascular tumors can be readily tied off or even removed by the finger-nail. The hemorrhage occasioned by the latter procedures is readily checked by the application of mild astringents. These are two forms of tumors in the gums, which on account of their simplicity and their frequent appearance, prompted me to name them first.

Now consider a class of tumors much more serious, although their name does not imply it, epulis. There are two kinds of epulide tumors; the one is firm, the other is soft. While the word epulis literally means a growth upon the gum, the name is a misnomer, inasmuch as tumors classified as epulide tumors are growths which, while they appear in the gum, have their original seat in deeper structures. The firm variety presents a dense structure, not, however, homogeneous throughout. They are firmly connected to the alveolar border, springing indeed from the very covering of the bone, the periosteum. This variety has not only bone as its base, but small independent collections of bone will, on examination, be found in its different parts. This tendency to organization into the bone is peculiar to sarcoma, and in fact is one of the essential characteristics of that kind of tumor formation. Soft epulis is composed of very succulent giant cells, which readily break down and ulcerate, assuming a very angry and malignant appearance, strongly suggesting carcinoma. It is impossible to outline the extent of invasion into the jaw occasioned by these tumors. They are at their very beginning so intimately associated with the bone that it is at no time possible to say absolutely that they are gum tumors, and this very fact marks their malignancy. It is this unrestricted growth that is typical of malignant tumors. We cannot define their outline, they present neither a well-defined neck or border, while they may occasionally strongly simulate innocent tumors by apparently exhibiting a slender pedicle, but the surgeon soon finds on removal down to the bone, without including the periosteum, a recurrence of a new growth from the same site. Epulis may be excited into growth as a result of irritation from decayed teeth or retained root stumps. It is said that they are encountered in women more frequently than in men. Professor Heath seeks to find reason for this fact that women shrink from operative interference oftener and will bear pain, like a toothache, longer than men. Besides that, they are liable to conditions in life under which operative interference is considered unwise, conditions to which men are not at all liable. (I refer to the period of pregnancy and lactation).

Left to itself epulis may attain great size and produce considerable deformity. Despite the fact that epulis signifies growths upon the gum, please allow me to repeat that it is necessary to appreciate the fact that it is growth implicating more than the soft tissues. Removal, therefore, without including part of the bone, means sure recurrence. For the purpose of removal, a strong Liston bone forceps and the surgical engine are the best instruments. The free hemorrhage following is most effectually controlled by the Paquelin thermocautery. Operations calculated simply to gouge out or scrape out the affected surface are not sufficiently radical. Dealing with a tumor of malignant character it is always better to remove too much than not enough of the suspected tissue. A tumor bearing resemblance to epulis is often found on the hard palate, and likewise possesses malignant attributes, therefore should receive summary treatment. Statistics show that most epulide tumors are curable, and that they are likely to occur at all stages of life.

A more serious affection of the gums and one to which attention is called, as dentists, more particularly, appears in a much more innocent garb, a mere ulcer. A sore appears, perhaps awakened by some carious tooth which does not heal kindly, exhibiting a tendency to extend, the borders become hard and thick and the base adheres to the bone beneath; this is cancer. Bone is never primarily the seat of carcinoma or cancer. This broad assertion was first made about thirty years ago. German pathologists at that time held cancers on the upper jaw as examples, positively disproving such statement, but we now know that there are but two locations in the superior maxilla in which carcinoma is ever encountered. The first begins as above indicated on the gum, the second in the antrum of Highmore; both the covering of the gum and the lining of the antrum are made up of varieties of mucous membrane, and it is in this tissue that cancer begins to grow, not in bone itself, each case starting not as a distinct tumor, but as an ulcer eating its way into the bone. Upon the gum a sore forms, presenting thickened edges, and by its firm immovable base, its infiltrating features, its tendency not to heal under treatment and possibly pain already of this stage, show its malignancy. Dentists especially cannot have this too strongly impressed upon them, that when a recent ulceration of the gums shows no inclination to heal after judicious treatment of a week or ten days, it should receive prompt surgical attention. If neglected we must anticipate bone invasion. This invasion becomes further evident by the loosening of the teeth, and even at this juncture radical operation is quite certain to be successful. Of course, we must again cut wide of the diseased surface and be thorough in the extermination of the affection.

Just here it would perhaps be wise to consider for a moment carcinoma as it originates in the antrum. As previously remarked carcinoma of the jaw in its beginning is not manifested by swelling, and its growth in the antrum more particularly illustrates this fact. Long before any swelling becomes apparent, the disease has not only undermined the maxilla but has spread in every possible direction. In persons of advanced years the first sign may perhaps appear in a violent toothache; a decayed tooth or stump is removed, and from the resulting cavity pus is found to discharge, the toothache remaining unrelieved. If the dentist will pass a probe up into the sinus of the antrum he may discover a softened mass of dead bone, and should be particularly guarded not to mistake the condition as a case of necrosis. If the removed root be carefully examined a soft slight growth may be seen attached to it; still, if even at this time the growth is not yet recognized, you will soon find the same fungus tissue growing out of the socket from which the tooth had been removed, or perchance by this time fistulous openings may have appeared on the hard palate or in the nostril through which fetid pus is discharged. To illustrate the various ways by which carcinoma may first present itself, Professor Kuster, of Berlin, calls attention to another train of symptoms which he had observed in this connection, which were a severe toothache and pain in the jaw, assuming the form of trigeminal neuralgia, in conjunction with which there had appeared persistent nose bleeding not accounted for by any existing nasal disease. He believes that the joint appearance of these symptoms, though there be no external evidence of swelling, fully justifies the making of an exploratory incision down and into the bone, and he claims that he has never failed to find the antrum in these cases in a state of cancerous degeneration. Professor Whitmarsch also reports a case where the appearance of a fungus mass in the nares, accompanied by a profuse nasal discharge, led to suspect cancerous degeneration, but in which case the true nature of the disease (carcinoma) was not made evident until revealed by a post-mortem examination.

It is seen by this that the various symptoms of cancer in the upper jaw concealed its true nature in the beginning, the growth progressing insidiously, and except to the most watchful eye cannot be recognized until it has led to extensive destruction of the bone, not perhaps until it has opened into the cavity of the mouth, nose, or orbit, all within the last few weeks and already beyond cure. Professor Butlin removed within seven weeks after the first manifestations of the disease a carcinoma, where he found not only the bone entirely destroyed, but sinuses burrowing into all the neighboring muscles. Under these circumstances it is evident that the most thorough removal of the upper jaw is totally inadequate to control the disease, if it is already advanced so that it can be recognized by external indications. The only safety lies in the very early removal of the entire jaw before the disease has extended to any appreciable extent. To disclose the existence of a malignant disease which so cunningly conceals its presence, it is evidently necessary to examine not only the mouth, but the nose, the orbit, and indeed, even the throat, when anything of the kind is even suspected, and will require the combined efforts of the dentist and surgeon. The dentist finds the suggestion of Professor Heath most valuable, that the attachment of any growth to the roots of extracted teeth should excite their suspicion of the presence of serious disease in the bone. Any such mass should be subjected to microscopical examination, in order to determine its true character.

Innocent tumors of the jaw may best be divided into two varieties, the hollow and the solid. The solids have already been referred to several times, but a few words on those known as hollow or cysts. Dependent upon the site and manner of formation, cysts are known as simple,. dentigerous and multilocular.

Simple cysts connected with the ends of roots of fully developed teeth may be so small as not to awaken even suspicion of their existence. When they attain greater size they are recognized by their slow growth, their localized character, and particularly by the gradual thinning of their covering, which at last becomes so attenuated that it crackles under slight pressure of the finger, and is painless. Dupuytren thought that the cysts are more frequently found in connection with upper cuspids than with any other teeth.

Dentigerous cysts are awakened by the irritation of an undeveloped tooth, when, on account of misplacement, inversion, or some other reason, teeth do not attain their maturity. The first appearance of a localized expansion of the jaw exhibits no marked characteristics to distinguish it from a simple cyst, even from a solid tumor. It is found difficult to differentiate a dentigerous cyst until with time the walls grow thin and bend under pressure; possibly, until finally by the absorption of the entire bone covering. Of course, in all such respective cases search should be made for any absent teeth which had not been extracted; and the fact that supernumerary teeth may be responsible for these cysts should not be overlooked. To effect a cure a simple incision into the cyst wall and to evacuate the fluid contents will not be found sufficient, such an opening speedily closing again. In these cases it is necessary to remove part, or possibly all, of the anterior wall, cleanse out the cavity thoroughly, remove the irritating tooth or substance, whatever it may be, and allow the cavity to fill up by granulation.

A word yet in regard to multilocular cysts. They are not a direct result of dental irritation, but are due to an ingrowth of the epithelium covering the gum. However, indirectly it may be said that also they are caused by dental irritation, inasmuch as the ingrowth of epithelium is produced by the irritation from carious teeth. They are usually found in the lower jaw, and if left to run their course are apt to attain great size. As the name implies, they are composed of a collection of cysts, being separated from each other by thin bony walls. As landmarks in diagnosis, the fluid contents, well-defined outline, slow growth and absence of pain, are the ones most important to remember.

The solid outgrowth of bone and cartilaginous tumors are recognized by their slow growths and extreme hardness, freedom of pain and well-defined margins. Their removal simply requires exsection with a saw at the point of attachment to the bone, and no recurrence need be feared. A variety of cartilaginous tumors is known to grow from between the plates of the lower jaw, and this leads us once more for a moment to the consideration of sarcoma, in order to throw more light on the difficulty of diagnosis. Carcinoma, as already said, springs from a surface covered or lined with skin or its substitute epithelium. Sarcoma, though, originates in any connective tissue structure, and to this class belong bone, muscle, tendon, and in fact, as far as the jaws are concerned, every part but the thin membrane covering the surface of the gum, and lining of the cavities in the upper jaw. It is evident, then, that sarcoma can spring from any part of the jaws proper. In fact, all malignant tumors originating in the jaws and not from the surface are sarcomata. Reference has already been made to the different varieties of this tumor formation, but a further short classification will aid in making things more plain. When in the lower jaw sarcoma is found arising from the periosteum or surface of the bone, it is termed subperiosteal; and when deep, from between the plates of the bone, it is known as central. One form has been spoken of, the superficial or subperiosteal sarcoma, which is the one interesting us mostly, usually termed epulis, and which, when originating from the body of the superior maxilla, is a disease of most malignant type. It is a growth of more or less organized fiber, cartilage or bone; one that usually involves the body of the bone, growing rapidly, attaining great size, spreadng into the muscles, recurring speedily after removal, and if it has once begun to break down and ulcerate is soon followed by infectious tumors in other situations in the body, wherever the circulation may find a convenient place to deposit some of their infectious material, as is often seen in the lungs or liver. As to central sarcoma, the lower jaw is more frequently the seat of this variety than any other bone. The central sarcoma is less likely to infiltrate in the surrounding structures than the other, and may remain shut up between the plates of bone for considerable length of time; this class bearing a striking resemblance to innocent central cartilaginous growths, such as before mentioned. As a rule they are more innocent, or more likely to remain dormant than the subperiosteal variety.

If a growth springs up which is simply a multiplication of cells, being a counterpart of the tissue from which they grow, for example, in bone, cartilage or fibrous tissue cells of the same kind are reproduced as fully matured types of these tissues, we would have as results tumors which are truly osseous, cartilaginous, or fibrous; but if instead, the cells do not mature, but remain in their embryonic state, this embryonic tissue growth is a sarcoma. There may be parts of this tumor which may mature so that at some points in its collection of true bone, cartilage or fibrous structures may be found. In some, the organization into fiber is so marked that the tumor may become quite hard; in others, the cells are mostly of the embryonic type, and the growth consequently remains soft. It is therefore apparent that under the term of sarcoma we find a group of tumors possessing the widest differences in histological make-up. They may have nothing in common either in color, texture or consistence; in fact, they cannot be distinguished in this way from non-malignant tumors. What marks their malignancy is their invasion into the surrounding structures.

Sarcoma is usually a disease of early life, and more frequently than any other tumor is the result of an injury, such as a blow, although carious teeth or any other irritation may be its cause.

It is evident, from what has been said, that the boundary lines between the various connective tissue tumors (sarcomata) cannot be drawn with anything like precision. There may be a single tumor in all stages of development of tissue at one and the same time. In others, there may be in evidence immature cells in an otherwise fully matured growth. With this condition existing, it becomes clear why it is difficult to distinguish between these tumors; but in a general way it may be said that rapidity of growth, softness of texture, invasion into surrounding structures, tendency to break down and ulcerate, great pain, and often very disagreeable odors, all lead to infer that we are dealing with a malignant disease; not to forget that all tumors with periosteum or bone as their base should be looked upon with suspicion, and generally removed.

There is a time in the history of each of these tumors when they are but a local disease, and when perfect removal can be accomplished. To this, of course, early recognition and speedy treatment are most essential. In the removal of these tumors the danger of their infecting tissues far beyond the recognition by the naked eye must not be lost sight of, and to effect a cure, a most thorough removal and radical work is the problem before us. Early and thorough removal is the motto. While the question, which method is the one least liable to lead to disfiguration, is an important one, the one how we can reach every diseased point still remains the most important. If at all possible, we should always cut wide of the disease, and in almost all cases this can be done when the operation is undertaken early. In some cases it may not be necessary to make external incision; however, each case becomes a law in itself, and the diagnosis and prognosis are the governing rules in the mode and manner of operation.

It is remarkable that even the most generous removal of either upper or lower jaw creates so little disfigurement in comparison with what one would expect from such an operation. Every one who has seen these cases becomes impressed with this fact.

A study of these tumors is beset with a great many difficulties, and an expose of them in language intelligible but not too technical is even a still greater task.

DOUBLE FRACTURE OF THE LOWER JAW.

DR. J. R. HAGAN.

Dental Cosmos, September.

One fracture was a little to the left of the symphysis, passing almost vertically through the alveolus and basilar process of the bone. This had already begun to unite.

The second and much more important fracture started to the left of the symphysis, running downward and backward, terminating almost midway between the symphysis and the groove for the facial artery. Nothing had been done for him except to take a few stitches in an external wound, and wash his mouth with aseptic washes. The left portion of the bone had been drawn upward and inward by the muscles. The left lower central had been removed, it only being held by the soft tissues.

To get an impression, an assistant placed an instrument between the left lateral and the right central, using the right central as a fulcrum, so that when pressure was put on it drew the two fractured ends together. A model was made. A thin saw was passed between the bicuspids on both sides, then platinum bands were made for the two second bicuspids, left lateral and right central. Two pieces of heavy German silver wire were bent to fit the inside of the teeth and soft soldered to the four bands. To prevent any possible displacement, some of the teeth next to the fracture were wired to the wire passing around the inside.

FRACTURE OF LOWER JAW.

DR. O. C. MOON, BEAVER DAM, WIS.

Dental Review, September.

The following interesting case is reported by the writer. As is so often the case, the dental surgeon was not called in until the physician failed.

Miss S. was struck on the chin by a piece of iron which had evidently been fired from a toy cannon. It struck a little to the left of the median line, and, cutting through the bone, plowed its way along the lower and inner edge of the bone, badly lacerating the floor of the mouth, the submaxillary gland and root of the tongue, and imbedded itself in the neck, back of and a little to the left of the trachea.

A piece of bone was gone the entire depth of the jaw and perhaps three-fourths of an inch in width, together with the left central, lateral and cuspid teeth. The lower edge of the bone on the left was also fractured somewhat, with a great many small fragments loose in the wound. The small loose particles were removed and an effort made to find the missile, without success.

The wound was dressed carefully and the two ends of bone fastened together with silver wire. This not proving sufficiently firm, the adjoining teeth were wired together as an additional support. Still further support being given by a splint and bandage under the chin.

Even after the ends of the bone were brought together as well as possible, there was still a space in the lower part large enough to insert the finger, and through this, partially, the wound was dressed.

After a few days it was found that there was a strong tendency to vertical displacement, the shorter section on the left being inclined to draw up and the other part down, by the action of the muscles.

To overcome this, a narrow plate of aluminum was fitted to the lingual surfaces of the lower teeth. This was then lined with a thin coating of gutta-percha, and while warm pressed into place and wired to two or three teeth on each side of the fracture. This answered the purpose nicely for a time, and permitted the proper treatment of the wound in the soft parts of the mouth.

On the twelfth day the slug worked into the throat and was recovered. It was then found to be a piece of iron three-fourths of an inch by one-half inch in size, with a curved part or hook at one end; and the wonder is that it could pass so deeply into the neck at the point it did, without doing more serious damage.

Soon after this the teeth to which the plate was attached began to loosen from the continual strain upon them, and it became necessary to resort to other means of holding the parts in place.

Heretofore it had seemed necessary to be able to get to the interior of the mouth readily in order to keep it in an antiseptic condition. The soft parts were so badly lacerated, including the submaxillary gland, that it was necessary to make frequent and thorough use of antiseptic washes. However, the interior of the mouth was healing so nicely it was decided to put in an interdental splint.

This was made by taking an impression of the upper jaw, and making a rubber plate for it, extending over the molars and bicuspids, and with enough thickness at the edges to prop the mouth open somewhat. This was then tried in the mouth and the thick portions dressed down till the lower teeth rested firmly against them with the broken parts in their proper relation to each other.

The thickened sides of the plate were then roughened somewhat and pieces of gutta-percha softened and molded onto them, and the splint with gutta-percha still warm placed in the mouth and the lower teeth pressed up into place—the aluminum plate having been previously removed. When the gutta-percha was cold, a four-tailed bandage around the chin and over the top of the head was all that was necessary to hold the parts in place, and the space between the upper and lower teeth in front was ample to allow the taking of food and for further use of antiseptic washes.

The bone being held firmly in place, united without further trouble, but such a large section being lost, the jaw is, of course, much narrower than before, and the teeth do not antagonize with the upper ones, but close entirely inside of them.

The chin having been originally rather broad and prominent, the reduction in its width really detracts but little from the general appearance of the face. But the teeth failing to antagonize, are left more ornamental than useful.

This trouble has been partially overcome by making a plate without teeth, fitted to the roof of the mouth and thickened at the edges to antagonize with the lower teeth. This answers the purpose fairly well.

TREATMENT OF TWO CASES OF FRACTURE OF THE LOWER JAW BY WIRING.

DR. STEWART L. M'CURDY, PITTSBURG, PA.

Dental Cosmos, October.

Disregarding the various excellent appliances used in the treatment of fracture of the inferior maxilla, he reports two cases in which wiring was practiced and records results, which are all that could be desired.

In order that wiring of bone may be speedily done, it is necessary to use a notched drill, as shown in Fig. 1. It is an easy matter to pass a drill through a bone, but it is not such an easy matter to keep the drill hole open or to re-enter after the drill has once been withdrawn.

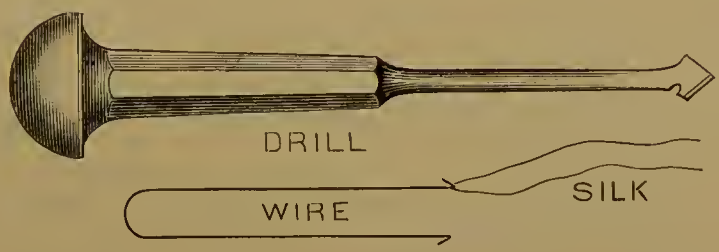


Fig. 1.

As will be observed, the drill is notched near the point. After it passes through the bone, a silk thread is thrown around the point and allowed to engage in the notch, when it is withdrawn. The drill hole once loaded with silk, the wire is attached to either end and drawn through.

In case of a fracture of the inferior maxilla, the drill is passed through the bone from without into the sublingual cavity. The thread is then drawn from within outward. To the internal end the wire is attached and also drawn outward. The wire is passed through the second drill hole in the same manner—i. e., from within outward.

The details of operative procedure given in the report of the following cases will more fully describe the technique:

Case 1.—J. Shaw, aged three years, seen in consultation; had been kicked in the face by a horse, producing a compound oblique fracture of the inferior maxilla. The fracture extended on the right externally from the cuspid to the first molar, back of and along the sockets of the four teeth. The teeth were so loose as to prevent the fragments from being secured and held in position by the use of silk thrown over them. Every means at the command of the attendants, as well as a dentist who had been called in to assist, which included the usual external splints and bandaging, a dental vulcanite splint, etc., had been used to hold the fragments in position.

He first saw the case on the ninth day after the fracture, at which time the fragment was tilted up to the left at least half an inch, and decided to wire. To secure solid bone through which to pass the wire on the right, it was necessary to drill through the bone below and between the roots of the lateral incisor and cuspid. The drill passed through the bone into the sublingual cavity, around which a loop of silk was thrown. The drill, now loaded with the thread, was withdrawn.

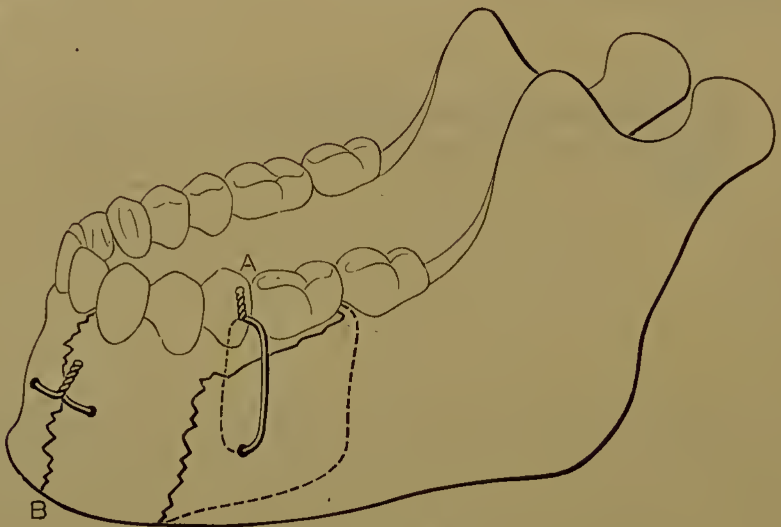


Fig. 2.

While the fracture extended to the second right molar, it was superficial enough not to loosen the tooth and destroy its power to support the wire, as were the teeth above mentioned.

The ends of the wire were brought together external to the first incisor, and twisted until the bones were brought into perfect apposition and the teeth on a plane. The ends of the wire were bent upward between the teeth and cut off just below the crown, which placed it out of the way of injuring the mucous membrane of the mouth. From this time on there was not a particle of trouble with the case. In about six weeks the wire was removed, with a perfect result.

Case 2.—J. B., aged sixteen years, was helping to coal up an engine at a coal tipple. His head was caught between the apron and the side beam of the tipple. He sustained, besides numerous contusions, a laceration of the left ear and left side of the face, and two fractures of the inferior maxilla—(see Fig. 2).

He saw the case on the eleventh day, and, as the physicians in charge had done everything ordinarily done to hold these fractures in position to no purpose, decided to wire. This was done as shown in Fig. 2. The fracture was quite oblique, and one drill hole was sufficient to include both fragments. The wire was thrown over the alveolar process and twisted in the other fracture—(Fig. 2, a).

The other break was at right angle with the long axis of the bone, and two drill holes were necessary—(see Fig. 2, b). The ends of the wire were twisted so as to completely approximate the fragments. The twisted ends were turned up and clipped off a little below the teeth. The result in this case was perfect in both fractures. The wires were removed in two months.

A METHOD OF TREATING FRACTURE OF THE INFERIOR MAXILLA.

DR. A. O. ROSS, COLUMBUS, O.

Ohio Dental Journal, May.

After experimenting with a number of different kinds of splints and appliances, the writer is fully convinced that the old-fashioned interdental splint, and four-tailed bandage, which is used by many M.D.'s to-day, is not the thing, for the following reasons:

First.—When the mouth is tied firmly shut with a four-tailed bandage, it is then necessary for the patient to exist on soups and liquids from three to four weeks, which he must take by means of a tube, through a space made by extracting a tooth, or back of the third molar.

Second.—Providing the joint of the maxilla has been injured at the time of the fracture, there is great danger of complete or partial ankylosis, if the jaw is held in an immovable position for three or four weeks, the time required for an apparatus to be worn.

Third.—It is impossible to keep the splint clean and free from odor, and the mouth healthy, when a bandage is used.

Fourth.—One of the greatest objections, however, is the inconvenience of vomiting when the mouth is tied shut. Frequently patients become very sick at the stomach, and vomit freely. If the four-tailed, or any other bandage of a similar kind is used, they will burst it loose and displace the fracture, if there is any tendency to displacement.

To overcome these objections he uses the swaged metallic interdental splint that is held in position by cement and bandages running underneath the jaw and permitting free use of the same.

In treating a fracture of the inferior maxilla, the first point is to properly diagnose the case and locate the fracture or fractures, if there is more than one.

Suppose the fracture is between the left lateral incisor and cuspid, extending diagonally across the jaw toward the left side, with a decided tendency to displacement, owing to muscular contraction. The diagnosis being made, proceed to take an impression of the parts in the following manner:

Have the patient close the mouth naturally, see that the back teeth are together, and the teeth at the point of the fracture are in their natural, position. If the articulation or occlusion is perfect, the jaw, as a rule, will be in perfect adjustment. Have the patient sit in a natural position, with the head thrown neither back nor forward, but natural. This point is emphasized, for the future comfort of the patient depends upon getting the lower splint to fit properly when the head is in a natural position.

With plaster of Paris or modeling compound, take an impression of the lower jaw on the outside. The impression should extend from angle to angle, the upper edge should follow a line drawn from the angle of the jaw to a point midway between the margin of the gums and the lower point of the chin. The lower margin should extend well under the body of the jaw, care being taken not to allow it to rest against the thyroid cartilage, or it will in a short time cause the patient a great deal of discomfort every time he swallows or moves the jaw.

This impression serves as the permanent lower splint, also serves to hold the jaw in position while the impression of the lower teeth is taken in modeling compound, which should be allowed to set quite hard, before removing, to avoid dragging of the impression. From this impression make a good heavy plaster model of the lower teeth, and, if they are not in their proper position at the point of fracture, with a fine saw cut the model in two, at this point, and articulate the pieces to a model of the upper jaw or teeth. When in proper position, stick the ends together with sticky wax. This will give a true model of the lower jaw. Take this model, and with common beeswax, build up to the gum margin all around, and varnish with any varnish that will make a

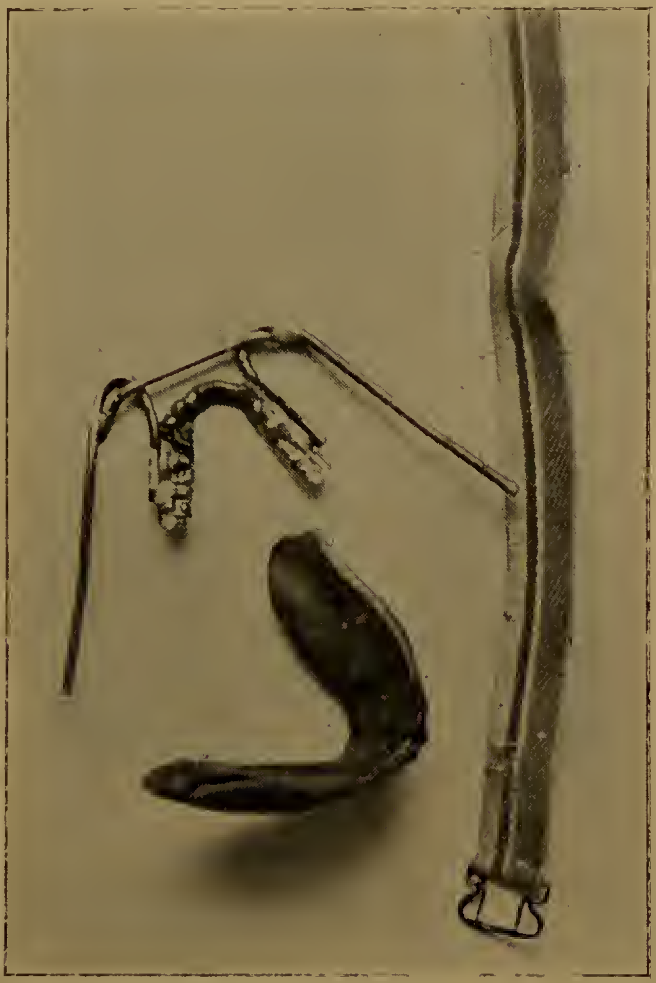


Fig. 1.

Upper swaged metallic splint. Lower plaster or modelling composition splint. Bandage with buckle.

smooth hard surface. After dusting this well with soapstone, make a sand mold and reproduce in zinc. From this zinc die, make a lead counter-die, swage a silver plate 26 gauge to fit the die, and trim the edges on a line with the gum margins. To each of the buccal sides of this plate, and well down to the edge, so that the upper teeth will not touch when the mouth is closed, solder a German silver wire 6 inches long and 3-16 inches in diameter, bent in such a manner that it will turn back where it comes from the corner of the mouth, and point toward the lower part of the ear, and come within ¼ inch of the cheek.

At this bend solder another wire of the same diameter, extending across in front of the lips, to act as a brace to keep the first wires from twisting off the plate when the bandages are put on. After polishing the splint it is ready to set.

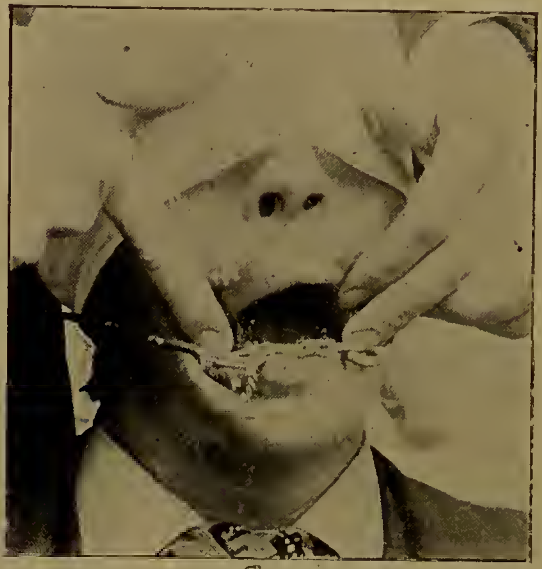


Fig. 2.

Upper splint in position without cement or bandages.

Brush the teeth well, remove all clotted blood and debris, and set the splint with some good cement, just the same as a bridge, except as soon as a splint is in place, have the patient close the mouth tightly and keep it closed until the lower splint is in position, and bandage by taking two pieces of ordinary suspender web about 18 inches long, with a common buckle sewed on one end, and passing from one horn of the splint, under the chin to the other horn, and back, buckling the same comfortably tight. With some adhesive, stick the bandages to the lower splint, that they may not become displaced; slip a little pocket over the horns of he upper splint, and pin the bandages to keep them from slipping orward. This all done, and the cement hard, have the patient open the mouth, then remove all surplus cement.

The illustration, Fig. 2, shows the apparatus in position.

The advantages of this method are as follows: With dilute isterine it can be kept perfectly clean and pure, as cement leaves no pockets for debris to collect; in event of swelling, the bandage can be very easily unbuckled, gives the patient free use of jaw, removing all danger of ankylosis; no irritation of teeth or gums; the articulation, or occlusion being perfect, the upper teeth do not get sore; having free use of the jaw, the patient can eat anything that he desires, also throw it up if it does not agree with the stomach, without the least danger of choking; no loss of weight on account of inability to eat.

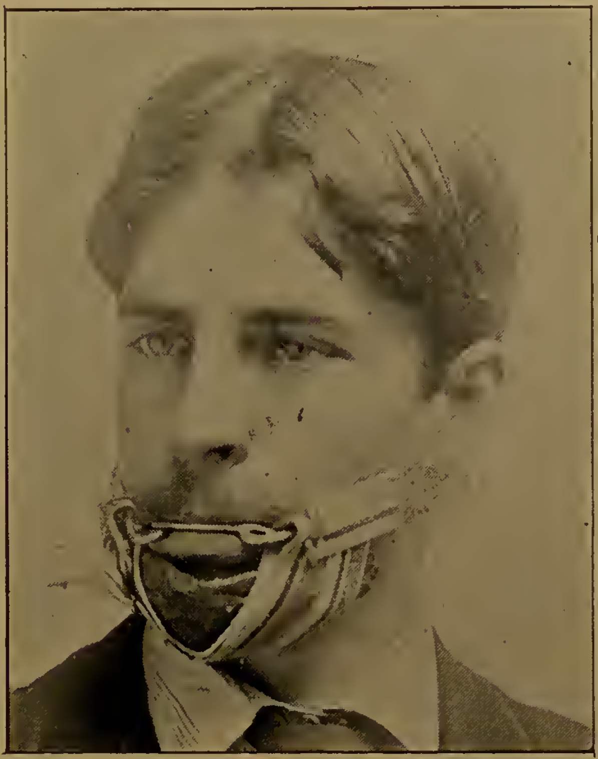


FIG. 3.

Apparatus as it appears when set. Upper splint cemented in place. Lower splint lined with cotton and bandaged to the horns of upper splint.

LARYNGOTOMY.

DR. R. H. M. DAWBARN.

International Dental Journal, April.

To relieve that accident which is the source of occasional fatality, choking to death from swallowing food the wrong way, and which generally occurs while laughing or talking, and at the same time endeavoring to swallow. A morsel of solid food enters the larynx and is caught at the narrowest point—the chink of the glottis (rima glottidis). If a medical man is present, it would be a lasting disgrace to him should the patient die, for relief may be obtained in a moment, with a single cut of a penknife in a perfectly safe region. When the head is thrown back there are two prominences of the larynx, easily distinguishable by sight or touch. The uppermost is the so-called "Adam's apple," the lower is the inferior edge of the larynx, or cricoid cartilage. Between these is a small depression, into which always the tip of the finger may be made to sink. This depression, the crico-thyroid space, is where the cut should be made; guarding the pen-knife with the finger and the thumb so that only a quarter of an inch of the blade is permitted to cut, and with a single thrust, cutting horizontally, this crico-thyroid membrane is opened, and we enter the free air-space beneath. We cut horizontally because thereby the space is wider transversely, and we get more room, and also the crico-thyroid artery is less likely to be divided. At once the patient can inhale freely; and now through the cut introduce some blunt instrument, like a lead-pencil, a hairpin, or even a match, and dislodge upward the food which has caused the trouble; the patient can then cough it out, The operation is not tracheotomy, but laryngotomy. The only blood-vessel there, is the little crico-thyroid artery, and that, if cut, can easily be controlled with the finger.

EXCISION OF THE INFRAORBITAL NERVE.

DR. T. W. BROPHY, CHICAGO.

Dental Review, February.

A woman, Mrs. A. R., aged thirty years, had for a period of five years suffered almost constantly with pains of a neuralgic nature, seated in the region of the right superior maxilla. Though many efforts had been made to gain relief, through the administration of remedies and local applications, none had ever been successful. When the patient first presented herself to Dr. Brophy, a careful examination was made, and the morbid condition pronounced neuroma on the infraorbital nerve, and the operation of neurotomy was decided upon.

The operation, briefly described, consisted in making an incision commencing just over the right lateral incisor and extending to a point opposite the first right molar. The soft parts were then elevated until the infraorbital foramen was disclosed, when with a tenaculum the nerve was grasped at its exit from the foramen, at which point the neuroma was found. The diverging branches were dissected out, the trunk was seized by forceps, drawn forward out of the foramen about one inch and excised. This wound was then cleaned antiseptically, iodoform gauze was placed in contact with it and patient dismissed. The operation was performed successfully without making an external incision.

NEW METHOD OF CLOSING THE SOFT PALATE.

DR. T. W. BROPHY, CHICAGO.

Dental Cosmos, July,

This method embodies a means of preventing the sutures tearing out. Fig. 1 shows cleft of the soft palate, the fissure extending through the palatal plates of the palate bones and into the palatal plates of the maxillary bones. After the edges of the tissues are well freshened, four silk sutures are introduced by means of a needle curved after the fashion of a gynecologist's needle. These are substituted by rather strong silver sutures. Then lead plates, perforated with holes to correspond with the number of sutures, and shaped so as to extend from the anterior margin of the fissure back to the distal border of the soft palate, are placed upon the palate and bent to conform to its shape. The wire sutures are then passed through the holes, as shown in the drawing, and twisted together. Tension is thereby exerted upon the divided portions of the palate, and the edges approximated. When necessary, the bones along the border of the hard palate nearest the molar teeth may be divided with a strong scalpel or chisel, and then the lead plates are easily brought toward each other, together with the tissues they embrace. Sometimes the elevation of the soft parts, with the periosteum, will serve, and this can be accomplished with a bow-shaped periosteotome. After the edges have been approximated as shown in Fig. 2, fine silk sutures may be employed to hold them in close contact and secure immediate union.

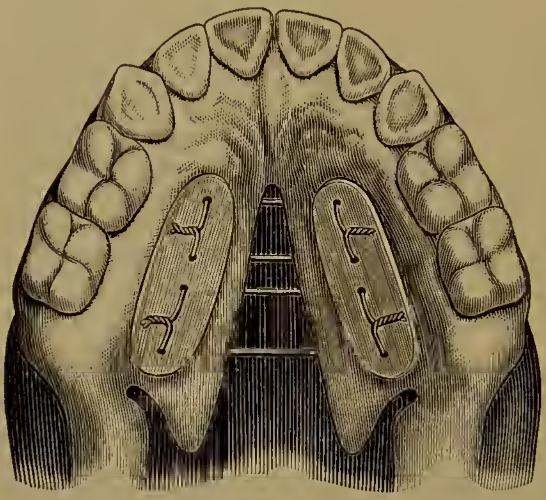


Fig. 1.

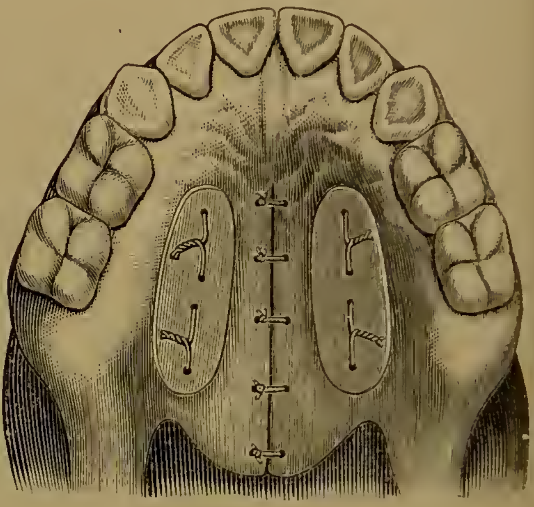


Fig. 2.

The lead plates prevent the cutting out of the sutures, as the pressure is upon the entire portion of the palate covered by them. They also serve as a splint, rendering the palate inflexible to a certain extent, suspending the vibrations, and putting the active muscles out of use until union of the cleft tissue may take place. Dr. Brophy has used the method in a sufficient number of cases to feel confident that better results in certain cases can be secured than by the use of sutures alone. The class of cases in which he recommends it are those in which the bones are well ossified and the deciduous teeth all erupted.

RELATION OF THE FRONTAL SINUS AND THE MAXILLARY SINUS.

Dental Cosmos, November.

Some of the incurable maxillary sinus cases are easily explained, by the study of Dr. Thos. Fillebrown, of Boston, who, having some incurable cases made a study of the anatomy of the parts, examining many specimens in the Harvard museum. He found in a majority of the cases examined that the infundibulum, instead of terminating in the middle meatus, continues as a half-tube which terminates directly in the foramen of the maxillary sinus. This was the case in eight specimens, and in seven specimens there was a fold of mucous membrane which served as a continuation of the unciform process and reached upward, covering the foramen and forming a pocket which effectually prevented any secretions from the frontal sinus getting into the meatus until the antrum and pocket were full to overflowing.

IMPLANTATION OF TEETH.

DR. LOUIS JACK, PHILADELPHIA.

International Dental Journal, March.

Implantation was undoubtedly originated by Dr. Younger, whose claim has not been publicly disputed. The date of his first operation was June 15, 1885. The general procedures of this operation as practised by him are so familiar that it is needless here to repeat them.

The result of the fixation of an implanted tooth when it has been properly adjusted and held in position has become indisputable. The evidence presented by men of reliability and sincerity of purpose has too much accumulated to fail to be convincing as to the feasibility of implantation.

There are certain requirements already established which govern success. The artificial opening must have the depth to give correct occlusion, and be but little larger than the root of the tooth to be inserted. The opening in the gum should be smaller than the cross section area at the cervix of the tooth. The mouth should be disinfected. The operator's hands and all instruments must be put in an aseptic condition. The tooth should be rendered aseptic by being heated in a disinfectant fluid. The tooth should not have shreds of peridental membrane upon it, but should not be scraped clean of the adherent portion of the membrane. During intervals of the operation the socket should be filled with a tent of the antiseptic fluid in use. When the tooth is inserted it is better that some force be employed to push it into place. It should then be securely fixed in position by some means which will give immobility.

With the exception of the formation of the opening in the gum and the trephining of the process, implantation has no essential differentiation from the requirements governing transplantation and replantation.

With this outline he proceeds to describe the methods he has pursued in the cases under his care.

The most important qualification connected with these operations is the means to secure thoroughness of asepsis. The usual reliance has been upon bichloride of mercury. He has avoided its use on account of its irritating influence and its depression of the vital force of the tissues, and has relied upon the aqueous solution of hydronaphthol and the aqueous solution of acetanilid.

The former is soluble in the proportions of 1 to 300. The latter is freely soluble in the ratio of 1 to 200. To effect the solution of hydronaphthol it is first dissolved in alcohol, when it becomes entirely miscible in water. In these proportions neither is irritating to the tissues, and when heated, thoroughly effect the disinfection of the tooth, the hands, and instruments. The importance of heating disinfectant solutions to increase their power has been well established. (For example, with bichlorid of mercury 1 to 20,000 of urine at 104° F. prevents fermentation. Anthrax spores lose their infecting power in weak solutions of the ordinary antiseptics at 170° F.) In each case he places the tooth in either of the above disinfectant solutions and raises the temperature to the boiling point. The instruments likewise are heated in the same manner.

These and the tooth are kept in the fluid in the intervals which occur during the surgical procedures.

Generally he has subjected the selected tooth to this process for a short time after opening the pulp-chamber to disinfect the root-canal.

The importance of securing immobility of the planted tooth cannot be overestimated, since the structural changes which produce the union of the tooth cannot be expected without a state of rest. It must be as essential here as in the case of fractures, since the process of ankylosis must be analogous to the process of the union of bones. Therefore, he emphasizes the necessity for absolute fixation. He takes an impression in plaster, and upon the cast makes a study of the case. The tooth is fitted in the plaster to correct relations with adjoining and the occluding teeth. It is then secured in place, when a metal cast is taken, and upon this is fitted a gold splint of whatever form and with whatever attachments may give stability. This is secured by clasps or by wire ligatures to the other teeth at the cervix. Additional security and cleanliness is effected by setting it in place with phosphate of zinc.

For the front teeth, which are the most difficult to fix, in some cases he opens into the pulp-chamber on the lingual surface and inserts a wire parallel with this face. The splint is formed to pass between the pin and the tooth. This, if the splint is secured to the adjacent teeth, establishes the fixation in each direction.

He says these mechanical preparations may appear to some to be unnecessarily tedious. But upon this point in a question where success depends upon careful observances these precautions are essential. To protect the surface of the root from injury during these procedures it is covered with a strip of mucilage paper wrapped upon it, or a layer of floss silk. To prevent drying out, the cast is covered with damp paper or kept in a box among damp paper. The final operation upon the mouth is simple, and is speedily done. It is, as above stated, preceded by every aseptic precaution.

In respect of replantation and transplantation, he invariably has broken up the remains in the alveolus of the peridental membrane. His impressions have been that this places these cases in the same relations which occur in implantation. The grounds for this procedure are that the experience of those who have replanted and transplanted teeth were of very frequent failure by early resorption, while the implantations when carefully performed have given favorable results.

To keep teeth for implantation cases, he places them in glycerine and water, equal parts.

SELECTING TEETH FOR PLANTING.

DR. W. J. YOUNGER, SAN FRANCISCO.

Stomatological Gazette, August.

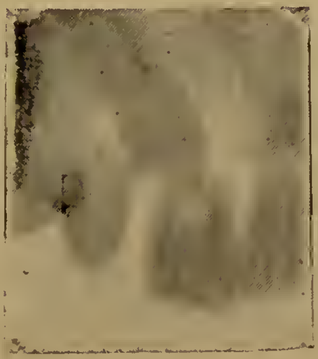
In selecting a tooth for planting there are two chief points to be observed : First, see that the tooth is a healthy one. This can be determined by the tooth being bright and translucent. Never use a tooth that has an opaque root, for the reasons already stated. Second, see that the tooth conforms in size and outline to the other teeth, because the operation must be made an artistic success as well as a surgical one. Therefore, be careful not to put a blonde tooth in a brunette, or a brunette tooth in a blonde, because, while the teeth, after being planted, modify their shade to that of the other teeth, yet the modification takes place only in the class to which they belong. See that the root has some pericementum. Everything else being equal, always give the preference to a fresh tooth, because the longer a tooth is out of the mouth the more its vitality is impaired.

LOST CUSPID FOUND BY ROENTGEN X RAYS.

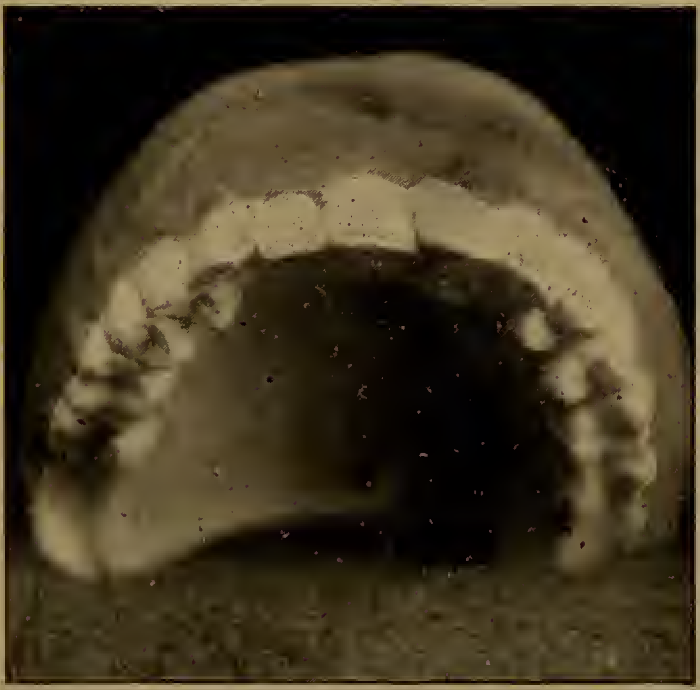
DR. B. H. CATCHING, ATLANTA, GA.

The practical value of this wonderful discovery was made manifest in the following case :

Miss G. R., age about nineteen years, called for consultation about a loose left superior central incisor, which was found to be as if it were a temporary tooth about to be displaced. Apparently there was no cause for such a condition. Reflected light revealed opacity. A hole was drilled into the crown from the palatal surface; hemorrhage ensued. A probe repeatedly introduced glided either to the right or left. An examination revealed the left cuspid missing, which history could not account for. The looseness of the central was supposed to be caused by the migrating cuspid, though there was not a particle of visible evidence that it was in the alveola process. Its absence from the arch, unaccounted for, would have been attributed either to non-development or early extraction. After its discovery by the X-ray, an impression and model of the teeth were made, the affected central cut away and a



X-ray photograph showing the malposed cuspid entirely imbedded in the bone, and pointing on the central. The picture is reversed.



Model of the upper denture showing cuspid missing.

small plate made. The crown which was hanging only by gum attachment, as the root had been entirely absorbed on account of the cuspid, was removed and the plate inserted. In a few days the point of the cuspid was visible immediately in the alveolus of the removed central.

MISCELLANEOUS.

TESTING PURITY OF ALCOHOL.

Alcohol used by dentists for annealing gold should be as pure as it is possible to get it. The ordinary commercial alcohols are usually diluted below the standard, which is ninety-four per cent.

The United States Dispensatory gives some simple tests, as follows:

It should not change the color of blue or red litmus paper previously moistened in water. If a portion be evaporated to one-fifth its volume, the residue should not turn reddish upon the addition of an equal volume of sulphuric acid (amyl alcohol).

When treated in a test-tube with an equal volume of solution of potassa, there should not be an immediate darkening of the liquid (methyl alcohol, aldehyd, and oak tannin). A simple approximate test for the per cent. of water is as follows: Moisten a small slip of filtering paper thoroughly with the alcohol and set fire to it. If when the alcohol is burned out the paper catches fire readily, the latter must be stronger than eighty per cent. If the paper barely catches fire, the strength may be presumed to be between seventy-five and eighty per cent. If it does not catch at all, the alcohol cannot be stronger than seventy-three per cent.

ALLOY RESEMBLING GOLD.

It consists of ninety-four parts of copper to six parts of antimony. The copper is melted and the antimony is then added. Once the two metals are sufficiently fused together, a little magnesium and carbonate of lime are added to increase the density of the material. The product can be drawn, wrought and soldered, just like gold, which it almost exactly resembles on being polished.

Even when exposed to the action of ammoniacal salts or nitrous vapors it preserves its color. The cost of making it is about twenty-five cents a pound avoirdupois.

AMALGAM FORMULA.

Dr. W. H. Trueman in the Dental Cosmos, gives the following as a good formula for amalgam:

Pure silver	100	parts
Copper	5	"
Pure gold	3	"
Zinc	10	"
Tin	150	"

Melt the silver, gold and copper together, and then add the zinc. Melt the tin in another crucible and add to the mass. Stir with an iron rod and pour into an ingot mold. The copper prevents contraction, the zinc prevents chilling when the tin is added, while the gold causes it to set more rapidly. More gold reduces hardness and edge strength of the amalgam.

MAKING AMALGAM.

DR. W. E. HALSEY, BROOKLYN, N. Y.

Dental Practitioner and Advertiser, April.

The writer says: Unless the directions be intelligently and carefully followed, and the metals themselves are of standard purity, the product may never be twice alike.

Take of silver 63 parts, of tin 33 parts and of gold 4 parts. Melt them in 100 pennyweight lots as follows: Place a sand crucible in an open grate fire. When it is red and coated with borax, a few pennyweights of tin are dropped into it, which melt immediately. The other commingled metals are poured in immediately from small scoops, a little powdered borax is sprinkled over the top and the crucible is covered. If the fire is what it should be, within four or five minutes the whole will be found in a molten condition, the crucible being heated but little above a cherry-red. The tin appears to reduce the melting point of the higher grade metals. The molten mass is stirred by a few quick turns of an iron rod heated to a cherry-red, and the mass is quickly poured into a shallow mold cut in soapstone, which should be cold, that the alloy may be crystallized at once. The ingot is then filed up, and all particles of iron or steel removed by a magnet.

This alloy requires a proportionately large amount of mercury for its proper amalgamation, and as it sets very promptly it demands quick manipulation.

MAKING AMALGAM.

DR. H. L. CRUTTENDEN, NORTHFIELD, MINN.

Written for The Compendium.

The following formula will make excellent amalgam. It is taken from American System of Dentistry:

Silver	52.00	parts
Tin	40.60	"
Gold	4.40	"
Copper	3.00	"

For 7½ oz. of alloy make the proportion as follows:

Silver	78	dwt.
Tin	61	"
Gold	6½	"
Copper	4½	"

The metals should be pure. Use a gas blast crucible furnace. If street gas is not to be had, use a gasoline apparatus. The crucible should hold about eight ounces. Melt the gold, silver and copper, then add the tin, stir with a clay pipe stem, pour into an ingot, when cold cut with a file. A magnet must be passed through the filings to remove the particles of steel from the file. This alloy is not good for use until it ages. Put the filings away in loose stoppered bottles for several months.

MIXING AMALGAM.

DR. F. T. VAN WOERT, BROOKLYN.

Ohio Dental Journal, December.

The filings and mercury are placed in the folds of a small piece of rubber dam, which is drawn tight around the mass, and rubbed briskly in the hand.

BENCH BLOCK.

International Dental Journal.

Bore a hole in the bench block and glue a cork in it. Excellent for filing small articles on.

BITE-PLATE.

Ash's Quarterly, March.

Mr. John Ellis states that impression trays, with the outer rim cut off, make excellent bite plates, and suggests that spoiled or useless impression trays can be utilized for this purpose.

CLEANING BRASS.

The method prescribed for cleaning brass in United States arsenals is said to be to make a mixture of 1 part common nitric acid, and $\frac{1}{2}$ part sulphuric acid, in a stone jar, having also ready a pail of fresh water and a box of sawdust. The articles to be treated are dipped into the acid, then thrown into the water, and finally rubbed with sawdust. This immediately changes them into a brilliant color. If the brass has become greasy, it is first dipped into a strong solution of potash and soda in warm water; this cuts the grease, so that the acid has full power to act.

MAKING NERVE BROACH.

DR. A. H. SUGGETT, MARYSVILLE, CAL.

Stomatological Gazette, September.

Take a piece of piano-wire, No. 19, one and a half inches long, fasten in a broach holder and, with a file, taper it like an ordinary broach; lay it on a piece of glass, place the blade of a knife on it near the end, and by bending it at right angles make a little hook. Then, with a stone in the engine, grind down to the right length. This makes a broach that can be insinuated into any canal, and there is no danger of breaking it off in a tooth.

STONING BURS.

American Journal Dental Science, February.

It is a comparatively easy matter for the dentist to stone his own burs, whether those previously stoned and worn or the ordinary cavity burs. It requires but a short time to bring each leaf of the bur to an edge with the use of a knife blade-shaped Arkansas stone, examining the bur occasionally during the process under a pocket microscope or hand magnifier. It is essential to perfect work that the stone be kept at a keen edge, and this is easily done as follows: Take a strip of sheet lead three inches long and attach it evenly upon a straight and perfectly level piece of wood about two and a half inches wide and a little longer than the lead. Allow the lead to extend over one end and the sides of the wood, bend the lead over and tack it to the wood over the sides and end—not on the top. Upon the top surface thus formed sprinkle some No. 1 emery, and without wetting or oiling the surface rub the stone lengthwise with the strip. Not more than three minutes' rubbing of the stone, after it has been used to sharpen a dozen burs, will be necessary to bring it to the required edge again.

TO MAKE A MIL-AMMETER FOR CATAPHORESIS.

DR. L. E. CUSTER, DAYTON, O.

Ohio Dental Journal, June.

Take an empty Barbour linen thread spool and wind it full of 28 or 30 gauge insulated copper wire. Mount this on a base which can be revolved horizontally. Fix a small jeweled compass on the spool. Now turn the base around till the compass-needle stands at right angles with the axis of the spool and mark off the deflections by testing in series with a standard mil-ammeter. Before each operation adjust the base so that the needle stands at zero.

CEMENT FOR GLASS OR CHINA.

Dental Record.

Cement for uniting broken edges of glass and china is made by taking two ounces of pulverized white gum shellac and half an ounce of gum mastic. Soak them together in a couple of ounces of sulphuric ether, and add half a pint of alcohol. When dissolved, the preparation is ready for use. Heat the edges of the article to be mended, put on the cement with a brush, hold firmly till the cement has set, lay the article away for a week, and it will break anywhere else than in the mended place.

CEMENT FOR HANDLES OR FERRULES.

DR. B. H. CATCHING, ATLANTA.

Mix equal quantities of powdered rosin and brick dust. For socket handle, fill the socket one third full of the mixture, heat the shank of the instrument and press it to place.

For ferrules, warm them and apply some of the powder, heat them to melt the powder and force to position.

TO REGULATE THE SETTING OF CEMENT.

Southern Dental Journal, February.

For some operations it is desirable to have the oxyphosphate set more slowly than usual; the least sprinkling of finely pulverized borax will do it. If you wish it to set rapidly use a small part of a drop of hydrochloric acid.

CEMENT SPATULA.

Items of Interest, June.

Dr. H. H. Sullivan, Excelsior Springs, Mo., says he makes a most excellent cement spatula by cutting an artist's three-inch palette knife to one and seven-eighths inch long.

TO ABORT A COLD.

Practitioner.

At the beginning of an ordinary cold, relief is frequently obtained by taking:

℞ Sodii salicylat	ʒ ii.
Spirit ammon. aromat.	℥ i.
Syrup aurantii	℥ ii.

M. Sig.: One teaspoonful every four hours.

ACUTE CORYZA.

Menthol	grs. vi.
Boracic acid	ʒ ii.
Subnitrate of bismuth	℥ iii.
Pow. benzoin	℥ iii.

A good pinch is taken and snuffed five or six times daily.

CONCAVE CHISEL.

Items of Interest, April.

An excellent chisel can be made by grinding the sides of a broad chisel to cutting edge and grinding the end concave.

TO STERILIZE COTTON.

A rather ingenious plan for sterilizing cotton is referred to in a French contemporary. A piece of cotton is twisted on a stick and dipped into a saturated alcoholic solution of boracic acid for a moment or so. It is then withdrawn from the solution, and a light is applied to it, as the result of which the alcohol burns out, while the boracic acid prevents the cotton from burning. Five seconds are enough; as soon as the flame turns green it is extinguished. The cotton remains white and dry, but absolutely sterilized.

CLEANING IMPRESSION CUPS.

Try placing them in benzine for an hour, to remove adhering compound.

TO STOP LEAKS IN RUBBER DAM.

DR. W. H. BAILEY, MENOMONIE, WIS.

Written for The Compendium.

Take the eyelets from an old shoe, fill them with soft solder, insert one, when needed, in a puncture in the dam.

STOPPING LEAKS IN DAM.

Stomatological Gazette, April.

Dr. Merriman's method of stopping a leak while the dam is on, and where the saliva is coming from between the teeth, is done by passing a ligature double between the teeth and catching a piece of spunk of suitable size in the loop of the ligature and drawing it tightly between the teeth.

To stop a hole in the dam, saturate a small piece of cotton in varnish, catch it in the point of the pliers and press into the hole, leaving it there.

TO REMOVE ODOR FROM RUBBER DAM.

Ash's Quarterly.

The unpleasant smell that is noticeable is easily removed, by soaking the rubber in cold water for two or three hours.

DIE METALS.

Dr. Haskel's formulas for making die metals are as follows. For the die use Babbitt metal:

Copper	1 part.
Antimony	2 parts.
Tin	8 parts.

If it lacks fluidity, or is too brittle, add more tin. For counter-die:

Lead	5 lbs.
Tin	1 lb.

Stir the lead while cooling. Coat the die with whiting to prevent adhesion.

FUSIBLE METAL FOR DIES.

DR. CLYDE PAYNE, SAN FRANCISCO.

Stomatological Gazette, June.

Tin	4 parts.
Lead	3 parts.
Bismuth	15 parts.
Cadimum	3 parts.

Fusible at 150° F.

FUSIBLE METAL DIE, SHOT FOR COUNTER DIE.

DR. R. MATHEWS, WICHITA, KAN.

Dental Cosmos, August.

The writer has made a low fusible metal which melts below the boiling point of water and is very hard. It is composed of forty-eight parts of bismuth, thirteen of cadmium, and nineteen of tin. It melts at so low a temperature that it can be packed with the fingers. A common plaster impression can be taken to the laboratory and poured at once without waiting to dry—can even be poured in water. For counter-dies he has used common modeling compound. He softens and places it in a ladle, and places the die on it and drives it in with a plunger and hammer; then places the plate on the model and swedges in the counter-die after it gets hard. Do this three or four times. But this will not draw it close enough; so he uses shot in the later part of the process.

Dr. W. A. Coston, Fort Scott, Kan., says: After making a die after Dr. Mathews's method and drawing the plate upon the model, he wraps the plate and die in a cloth to prevent the shot from getting between them; then places it in a strong cylinder containing the shot, and with a close-fitting piston drives it down. He uses the method extensively for aluminum plates. After using five or six times the shot became battered; but chilled shot lasts better.

SHADING CEMENT FILLINGS.

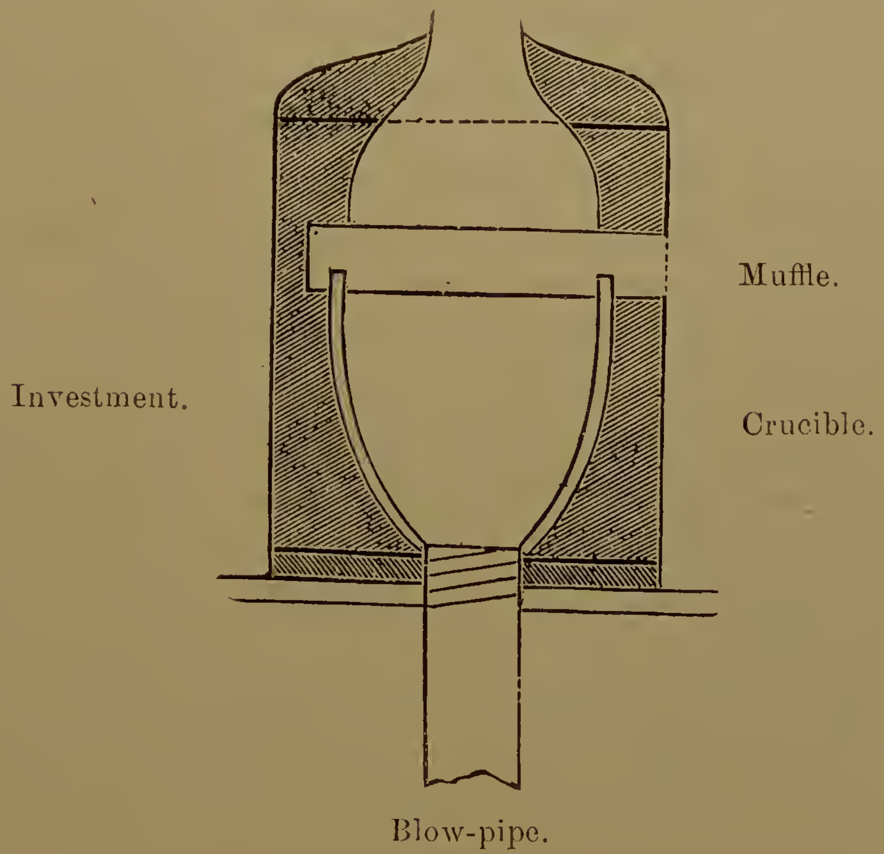
Dr. Fernandez secures the exact shade required in a cement by intermixing finely-pulverized jeweler's enamel, also burnishing this powder into the surface of a cement filling, before it is perfectly hard, prolonging insolubility.

TO MAKE A SMALL FURNACE FOR BAKING PORCELAIN.

MR. WILLIAM RUSHTON, ENGLAND.

British Journal Dental Science, September.

Obtain from a wood-turner a hollow cylinder of wood, 4½ inches long, inside diameter 3 inches, sides 3-16 inch thick, open at the top, but having a bottom half an inch thick. Let this pattern be cast in iron, and let a round hole be drilled in the side, the center being 3¼ inches from the bottom, and another hole be drilled through the middle of the bottom. The hole in the side should be 1 inch in diameter, and is for the mouth of the muffle; the hole through the bottom is to admit the nozzle of a Fletcher's injector blowpipe. Let the nozzle of the blowpipe be tapped for about ¾ inch down, and let the bottom hole of the furnace be threaded so as to allow the blowpipe to be screwed into it. Let the leg of the blowpipe nearest the nozzle be filed off. Next obtain one of Morgan's plumbago crucibles, 3 inches high and 2½ inches diameter. With the sharp end of a riveting hammer chip a hole in the bottom of the crucible, and with a file enlarge the hole to the diameter



of the blowpipe. Next obtain a piece of platinum foil $3\frac{1}{2}$ inches by 3 inches of the thickness usually employed to cover roots in pivoting. Bend it in this fashion with the ends interlocked, and hammer the ends closely down, to prevent gasing. We now have a platinum muffle, $3\frac{1}{2}$ inches long, with a flat bottom $\frac{7}{8}$ inch wide, dome-shaped top and open at both ends. At one end make a few cuts with scissors into the dome-shaped part to allow of the end being closed by bending the platinum down at right angles. Now place the crucible in the furnace and file it down where the muffle goes until by passing the muffle through the hole in the side of the furnace it rests on the crucible on a level with middle of the hole. Now sink the crucible in the bottom of the furnace with sand and plaster, taking care to keep the hole at the bottom free. Then mix some fresh sand and plaster, and plaster it round the ends of the muffle now placed in position, taking care to imbed the far end in the investment. Build the investment up somewhat dome-shaped, allowing $\frac{3}{4}$ inch between the investment and the muffle on each side, and having about $1\frac{1}{4}$ inches aperture above. Let the part of the muffle that projects from the hole in the side be turned down flush. Make a tray with another small piece of platinum foil. A door for the muffle can be made with a little sand and plaster or fire-clay. This furnace is large enough for four teeth or a small bridge. With a hole drilled in the bench for the blowpipe to pass through, the furnace can be put together at will and kept out of the way when not wanted. The blowpipe can be used for melting gold or other purposes of the workshop. A second plumbago crucible with a half-inch hole knocked in the bottom and used as a funnel after the furnace is lighted is an improvement. Asbestos and plaster is better than sand and plaster. Fireclay four parts by bulk to one of sawdust, and made into a paste with silicate of soda (liquid silex), is better still. The total cost, exclusive of the foot-blower, should be under two pounds ($10), the chief expense being the platinum.

SOLIDIFIED GELATIN IN THE ARTS.

Scientific American.

Gelatin possesses the curious property of becoming insoluble in contact with formic aldehyd, and, at the same time, of preserving perfect transparency. Gelatin thus rendered insoluble resists water, acids and alkalies, and resembles celluloid, but has the great advantage over the latter of not being inflammable. Thus a new product, easy to obtain and possessing properties which will strongly recommend its use in the arts. The gelatin is the ordinary article of commerce, while the formic aldehyd is what is known as "gormol," "formalin" and "tannalin." The commercial product is a 40 per cent. solution of formic aldehyd in water, and is a colorless, syrupy liquid, of a pungent odor, whose vapor is not inflammable. It is also a powerful antiseptic. To obtain molds of statues, etc., for example, two pounds of good white gelatin are steeped in a quart of water over night, when the whole is melted over a water-bath. The mold, which may be of plaster, clay or metal, having been prepared, the formic aldehyd is poured into the melted and slightly cooled gelatin, the whole is then well stirred to obtain a homogeneous mixture, and then poured into the mold and allowed to cool. After the object is taken from the mold it is finished by immersing in, or, if too large, painted with a concentrated solution of formic aldehyd. Objects thus made are transparent and resemble glass. Beautiful imitations of white marble may be obtained by previously adding to the gelatin some finely sifted zinc white, mixed with a little water and alcohol. By mixing the oxid of zinc with appropriate colors, objects of all shades may be obtained, and, by properly arranging the colors, veins, striæ, spots, etc., may be produced. The solidified gelatin may be used for imitating mother-of-pearl, tortoise shell, amber, coral, etc., and for the manufacture of toys and artificial flowers.

FINE GOLD FOR FILLING.

DR. MAX SICHEL, SAN FRANCISCO.

Stomatological Gazette, May.

Dr. Sichel has presented to the Stomatological Club the following method of making fine gold, which, it is considered, makes the finest working, most compact and cohesive filling gold of any now on the market:

Take fine gold, dissolve in 2¼ parts of muriatic acid and 1 part nitric acid until gold is all dissolved and becomes red like blood tears. After it is cool add distilled water—say 1 ounce of gold to 12 ounces of water. Let it stand for a week or ten days, when the chloride of silver will be found on the bottom; decant. Then add oxalic acid until gold is precipitated. Let it stand forty-eight hours longer, when the gold will be found well precipitated. Then pour it off and wash well until all the oxalic acid is out. Dry it in a dish, put it in a crucible lined with bone-dust, melt it and then roll.

ROLLED GOLD FOR FILLING.

Pacific Stomatological Gazette, January.

A report is made of a clinic by Dr. J. E. Cummings, who prepares his own gold by taking an ingot of gold and rolling it in a mill to the thickness of No. 100 foil and filling a compound cavity in a molar. Dr. Sichel says, after rolling the gold it should be immersed in hydrochloric acid, which removes any trace of iron. Wash with distilled water and anneal on mica.

RESTORING TARNISHED GOLD.

The Jewelers' Circular.

The following mixture is an excellent one for restoring gold which has become tarnished:

Sodium bicarbonate	℥ xx.
Chlorinated lime	℥ i.
Common salt	℥ i.
Water	℥ xvi.

Mix well and apply with a soft brush. A very small quantity of the solution is sufficient for effecting the desired purpose, and it may be used either cold or lukewarm. Plain articles may be brightened equal to new by putting a spot or two of the liquid upon them from the stopper of the bottle and lightly brushing over the surface with fine tissue paper until sufficiently dried off to accomplish the object intended.

ALUMINIZED GUTTA-PERCHA.

DR. F. W. BLISS, SANTA CRUZ, CALIFORNIA.

Stomatological Gazette, July.

White gutta-percha	8 parts.
Aluminum filings	5 parts.
Oxid of zinc	1 part.
Whiting	½ part.

The above preparation is highly spoken of by those who have tested it for filling. It is said to last better, and not to swell in the cavity.

AMBER IN GUTTA-PERCHA A FILLING MATERIAL.

DR. WILLIAM DUNN, FLORENCE, ITALY.

Written for The Compendium.

Powdered amber	2 parts.
Pure gutta-percha	2 parts.
Oxide of zinc	1 part.

The above makes a most excellent filling, very durable, and having much of the horny characteristics of the earlier gutta-percha preparations.

WHITE GUTTA-PERCHA, TO MAKE.

Stomatological Gazette, July.

Dr. Sichel says to make white gutta-percha, dissolve the base plate material in chloroform and put it in a solution of chlorid of lime for one week, filter and expose to the sun for a week.

CLEANING HANDS.

DR. W. H. BAILEY, MENOMONIE, WIS.

Written for The Compendium.

A piece of pumice stone dipped in a 25 per cent. solution of sodium peroxid and rubbed on the fingers will quickly remove flask stains therefrom.

CLEANING THE HANDS.

DR. J. H. DREXLER.

Southern Dental Journal, November.

To remove the black grease from the hand after handling flasks, use a small quantity of spirits of turpentine. Rub this well over the dirt, then wipe with dry cloth, then use soap and water. After drying use vaselin or glycerin.

CLEANSING PASTE FOR THE HANDS.

DR. A. C. HEWITT.

To half pound pulverized borax add one pound carb. soda and a half pound fine pumice, with sufficient glycerin to form a paste. Use in place of soap to cleanse and whiten the hands.

CLEANSING THE HANDS.

DR. BURTON L. THORPE.

Items of Interest, April.

A good remedy is to keep a box of corn-meal on the wash-stand. Lather the hands freely with soap and rub with meal, which readily removes all dirt and stains. After this, rub the hands with tincture benzoin, one part, and glycerin, three parts.

CLEANING RUSTY INSTRUMENTS.

Journal British Dental Association.

Brodie gives the following as an effective method of cleaning rusty instruments: Fill a suitable vessel with a saturated solution of chlorid of tin in distilled water. Immerse the rusty instruments and let them remain over night. Rub dry with chamois after rinsing in running water, and they will be of a bright silvery whiteness.

TO PREVENT INSTRUMENTS RUSTING.

Dental Register, October.

A very small amount of alkali is sufficient to keep metal from rusting, so that if steel, iron, nickel or copper instruments are dipped in five grams alcohol, containing one or two grams of either borate, carbonate, bicarbonate, or benzoate of soda, they will not tarnish.

TEMPERING INSTRUMENTS.

After shaping and polishing the instrument, heat to a cherry red and plunge into ice water. The main point is in heating. As in everything else, practice makes perfect.

TEMPERING INSTRUMENTS IN CARBOLIC ACID.

DR. WILLIAM DUNN, FLORENCE, ITALY.

Written for The Compendium.

Instruments heated to a cherry red and plunged into carbolic acid liquid acquire a very elastic temper and seem tougher than when tempered in water. When thus hardened, the temper may be drawn as usual if necessary.

INVESTING MATERIAL.

Written for The Compendium.

Dr. G. C. Brause, Harriman, Tenn., says plaster with soapstone makes an excellent investment material.

ALUMINUM PAINT FOR MODELS.

DR. JOHN G. HARPER, ST. LOUIS.

Dental Review, June.

Aluminoid is a combination of rubber cement, any rubber dissolved in commercial chloroform and aluminum-powder. It is used to line the palatal surface of rubber plates.

To make: Dissolve rubber, such as is used for vulcanizing, in commercial chloroform. It should be of the consistency of thick molasses. Incorporate with this about twice its bulk of aluminum powder; mix well, and this gives aluminoid. To use: Coat the model with liquid collodion, and apply the aluminoid, which should be thinned with chloroform, so that it will flow like paint; give four coats, allowing five minutes for each to dry; allow ten minutes or more for the last coat; the case being packed close, vulcanize and finish with brush and pumice, ending with chalk. The aluminum powder can be procured from dealers in art supplies.

MODELING COMPOUND.

Journal de Pharmacie et de Chimie gives the following as the composition of modeling or impression compound:

Stearin	25	grams.
Copal, semi soft	25	grams.
Talcum, powdered	50	grams.
Carmine, coloring	0.5	grams.
Oil, rose geranium	6	drops.

THE ORBICULARIS ORIS AND THE MUSCLES OF EXPRESSION.

DR. W. C. BARRETT, BUFFALO, N. Y.

Dental Cosmos, October.

The orbicularis oris is the most complicated and involved of the muscles of the human body, whether we consider it from its anatomical or functional aspect. It is commonly considered a sphincter, but it is very far removed from this class, in that none of its fibers are continuous about the cavity which it surrounds. It is not a simple muscle, but is made up by the intermingling and intercommunicating of a large number of facial muscles. In fact, the distinctive fibers of the orbicularis are comparatively few, passing only across the lips, and not around them. The compression of the mouth is not even produced as in the eye, in which the orbicularis palpebrarum passes nearly around. The mouth cannot be completely pursed up, as with a true sphincter, but it can be drawn together by the combined action of a considerable number of muscles. Its expressiveness is not produced by a simple muscular action, nor can any of the passions be portrayed by any one set of fibers. The marvelous changes are brought about by combinations made possible through the intercommunication already referred to.

The orbicularis oris is the common meeting ground of all the muscles of facial expression. Fibers from each and every one of them communicate, either primarily or secondarily, with the true orbicular fibers. Even the muscular portion of such a distant one as the occipito-frontalis has its means of communication, and from the clavicle to the coronal suture there is a functional union of all the expressive muscles of the face and head. The mingling of the fibers of all these muscles make the structure of the orbicularis very complex. Muscles like the depressors and the levators, the filaments of which are arranged at right angles to the margins of the lips, crossing it, give vertical fibers. Those of the buccinator, the risorius, etc., added to the longitudinal fibers of the orbicularis proper, furnish transverse filaments, while a third set run diagonally across, obliquely between the other bundles, from before backward, and from the skin to the internal mucous membrane.

The muscle, as a whole, may be divided into the internal or labial, and the external or facial portions, according to whether the layers are mainly composed of the fibers of the superficial or deep muscles, but no accurate line of demarcation can be drawn, because of the diagonal fibers that interlace. The deep portion has but a restricted attachment to the bone beneath, that of the upper lip having the naso-labial slips, which give the prominence that forms the two vertical ridges near its center, dropping down from the cartilage of the nose, and another in the incisive fossa, while that of the lower lip is merely attached at the incisive fossa on each side. The superficial part of the muscle has no bony attachment whatever, but is held in position by the diverging muscles of which it is composed. This gives extreme mobility to the whole mouth, the lack of bony attachment accentuating it, for if the superficial fibers are strongly contracted and the diagonal ones relaxed, the lips are protruded, while if the deeper layers and the oblique ones are contracted, the lips are drawn against the teeth.

The buccinator belongs to the deeper layer, and its fibers decussating or crossing at the angles of the mouth, make up a large part of the transverse portion of the orbicularis. It has its origin along the distal line of the alveolar process of both the upper and the lower jaws, and in the pterygo-maxillary ligament behind, many of the fibers from the upper part crossing and forming a part of the orbicularis below, while those of the inferior part cross to be inserted in the upper lip. These decussating fibers are attached to the alveolus as far forward as the margin of the canine fossa, and they should dominate the shape of any artificial denture at this point.

The levator anguli oris, the levator menti, and the quadratus menti belong to the intermediate layer, while the levator labii proprius, the zygomaticus major and minor, the triangularis menti, the risorius, and the levator labii superioris alæque nasi, with the fibers of the platysma myoides, make up the superficial layer. But certain fibers of nearly all these muscles cross and, accompanied by portions of the deep fascia, penetrate even to bony attachments.

It is not, however, the anatomy of these muscles that so much interests us as their function, and I desire to indicate in what way the expression of the countenance may be affected by malpositions of the teeth, or by unskillful operations on the part of the dentist.

First, let us consider the levator labii superioris alæque nasi. The action of this muscle is to raise and slightly evert the inner half of the lip, and at the same time lift the wing of the nose, and it produces an expression of disgust. It is especially used in sneering. In certain instances in which the central incisors are especially prominent, while the laterals are retracted, we have that peculiarly impudent and deriding aspect that is sometimes called the squirrel or rat-face. If an artificial plate be too prominent beneath it, there may be produced the vacant, idiotic look, induced by the compression of the oblique fibers of the orbicularis oris, and the consequent eversion of the labial edge.

A little nearer the angle of the lips, and above the cuspid teeth, but upon the superficial labial surface, lies the levator labii proprius. The action of this muscle is quite complex. With the levator labii superioris alæque nasi it raises the lip, everts it somewhat, and gives a peculiar sneering expression to the countenance. The carnivora in snarling brings this muscle into play, and thus expose the cuspid teeth. In connection with the depressor anguli oris, or triangularis menti, and the orbicularis palpebrarum, it is especially used in crying. The closure of the eye by contraction of the latter muscle assists in raising the lip, while the triangularis menti draws the mouth into the shape of a parallelogram, and gives a peculiarly lugubrious expression to the face. If the cuspids be unduly prominent, or if a plate lifts the muscle too much, the consequence may be, when the other muscles are at rest, a permanent sneer. With the contraction of the orbicularis palpebrarum and the triangularis menti, the face has an expression of extreme sadness.

The buccinator as a muscle of expression acts secondarily. From the peculiar direction of its fibers when it is in contraction, the muscles of the deep layer are pursed up at the corners of the mouth, while those of the more superficial layer are peculiarly puckered by the consequent drawing of the levator and depressor anguli oris; a deep wrinkle is seen at the angle, while the risorius is placed upon a stretch, and an insincere and mocking appearance is the result. This will be induced when an artificial denture is inserted that has no depression at the canine fossa. The superior decussating fibers of the buccinator are placed upon a stretch, and a peculiarly disagreeable expression thereby induced. The same abnormality of the natural denture, or the same improperly constructed artificial plate that thus unduly distends the buccinator, will act upon the levator anguli oris, and intensify the disfigurement. This muscle raises the corner of the mouth, and at the same time draws it inward. When too much distended there must be a continued muscular effort on the part of the triangularis menti to keep the corners of the lips in place, and this results in a painfully strained appearance, and adds to the distortion.

The zygomatici, major and minor, are the muscles most used in smiling, as they draw the angle of the mouth upward and outward. When the zygomaticus major is strongly contracted, it draws together the tissue about the point of its origin, and causes a fullness in front of the malar bone. If now the orbicularis palpebrarum be contracted, the tissue between the origin of the zygomaticus and the outer canthus of the eye is peculiarly wrinkled, producing what are called "crow's feet," a disfigurement which ladies especially most earnestly desire to avoid. If both the zygomatics are placed upon a stretch by undue distention, the mouth is placed upon a perpetual broad grin. If, on the other hand, they are unduly relaxed, the triangularis menti draws down the corners of the mouth, and gives the opposite expression.

The risorius has its origin in the masseter, and its action is to draw the corners of the mouth directly outward. It gets its name from the former supposition that it was the muscle of laughter, but all the late anatomists know that this was a mistake; when it is contracted it gives an expression of pain. This is the case in tetanus, and the appearance in that condition is hence called the "risus sardonicus." If the first molar in either the natural or an artificial denture be placed either within or without the proper position, the risorius may be caused to give a very peculiar and painful expression.

The platysma myoides is not as much affected by the dentition as some of the other muscles. Yet there are few whose action is more complex. Arising as it does from the deep fascia of the upper part of the chest and neck, it is involved in all the muscular movements of the important pectoralis major, the deltoid, and the sterno-cleido-mastoid. Its long bundles of fibers continue to the borders of the jaw, where some of them are inserted; but others cross the lower jaw, and, continuing beneath the triangularis and the quadratus menti, are lost in the orbicularis oris, while the fibers crossing the angle of the mouth are mingled with and lost in the fibers of the levator labii proprius and the levator labii superioris alæque nasi. Hence, any unusual exertion of the pectorals and the deltoid exhibits itself in the face. In heavy lifting, the corners of the lip are drawn down, and even the wing of the nose depressed by the strain placed upon the platysma, through its origin in the fascia of the muscles of the arm and chest, and its connection with the orbicularis oris and the levator alæ nasi. It cannot then be lost sight of in arranging the teeth, and its action upon the orbicularis oris needs careful study by the artistic dentist.

The depressor anguli oris is, of course, affected by anything that unduly contracts the levator anguli oris and the zygomatics. If, on the other hand, these muscles are left too lax, the depressor, or the triangularis menti, draws the mouth out of position. If the lower teeth are too prominent, or if a lower artificial denture places these muscles upon a stretch, it may easily be seen that not only will the symmetry and proper expression of the lower lip be destroyed, but that the opposing muscles of the upper lip will draw that also out of place. Especially must the natural expression of the canine fossa be retained, that the triangularis menti may not be distorted, and so the natural expression be entirely lost.

A very disagreeable fullness of the lower lip may be induced if an artificial plate too much distends the quadratus menti, or the depressor labii inferioris, and the levator menti, or levator labii inferioris. If the latter especially be strained by undue fullness near the center of the lower lip, it induces a peculiarly haughty, supercilious expression, which may do the wearer of it great injustice. This apperance may be brought about by malposition of the teeth irrespective of either the natural or the artificial alveolus. If, for instance, the lower edge of an inferior plate be too thick at the incisive fossa, the origin of the levator menti, the point of the chin will be disagreeably drawn up. If now the teeth be placed too far back, the natural fullness of the orbicularis is not preserved, and the decussating fibers of the buccinator and those of the platysma will draw in the margin of the lip, and a peculiarly dogged, obstinate expression will be the consequence.

If a plate be too full at the canine fossa of the upper jaw, the levator anguli oris is distended and the corner of the mouth is raised, while at the same time the descending fibers of the buccinator draw up the inferior angle of the mouth, the risorius is pulled out of position, and a half-sneering, half-weeping expression is seen. At the same time, the zygomatics may be relaxed by the lifting of the lip, and there will be a distortion of the tissues covering the malar bone. Hence by an artificial denture that has an undue prominence at one point, every expression of the face may be changed, and not a muscle that is connected with the orbicularis oris remain at rest in its natural state.

SIMPLE RHEOSTAT FOR CATAPHORESIS.

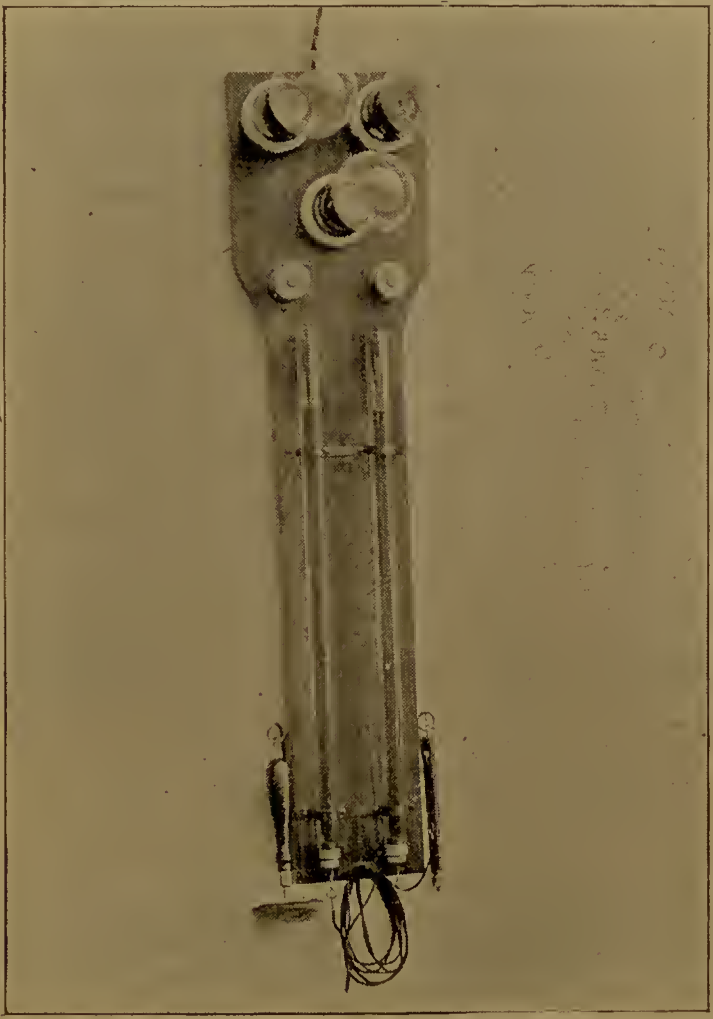
DR. W. H. HIRSCH, PIQUA, OHIO.

Ohio Dental Journal, July.

The 110-volt Edison current is the one commonly used and best adapted to our work. In order to use it for cataphoric work, it will be necessary to have some other resistance besides the rheostat, and for this use lamps. In the mains connect in series three 10 C. P. lamps, then between the first and second lamp attach a wire which leads to one side of the rheostat, and between the second and third lamps connect another wire, which leads to the other side of the rheostat.

This gives a shunt current which should be used in the relief of sensitive dentine, but for bleaching and sterilizing, unscrew lamp No. 2, which throws the rheostat in series with the main current, and will furnish all the energy ever needed for this work.

To make the rheostat, select two glass tubes, 15 inches long and ½ inch inside diameter and about ⅛ inch thick, and with a corundum wheel bevel off all sharp edges at the ends of the tubes, then take two rubber corks, the proper size, and drill a hole lengthwise through them ⅛ inch in diameter, and have turned two little brass pieces the shape of a "T," the upper part being just small enough to pass inside of the glass tube, and the rest turned down so it will fit snugly into the rubber cork. In the lower end of the brass piece have a small hole drilled to receive the key of the conducting cord to electrode. Put the "T" shaped brass piece in the



rubber cork and press the cork firmly into the glass tube, and you will have a water-tight seal for the tube and one pole of the rheostat finished.

Next, have two small weights, or plungers, turned two inches long, the largest part being $\frac{3}{8}$ inch in diameter and tapering to a very fine point. The object of having them tapering, is that when the weights first touch the water but little surface is in contact with the water; therefore, but little current can pass through, as the more surface there is in contact with the water, the more current will pass through, even though the distance between the poles and purity of the water remain the same.

Solder to the large ends of the weights, or plungers, small brass rods; let them pass through ordinary corks that will stop the upper ends of the tubes. Connect the upper ends of the rods with the wire that comes from the lamps. To prevent the too easy slipping of the rods through the corks, springs can be fixed in each cork to act against the rods. The whole apparatus is attached to a wooden base as shown in the cut. The tubes must contain only the best distilled water. Impure water will not do.

Place the positive pole, or electrode, in the tooth with the medicine you wish to use, and the negative pole in the hand or on the cheek, and lower the rods until they just touch the water, then lower one at a time into the water until the desired amount of current is obtained. If a battery is used, only one tube is necessary.

WATER RHEOSTAT FOR CONTROLLING ELECTRICAL APPLIANCES.

DR. L. E. CUSTER, DAYTON, OHIO.

Ohio Dental Journal, January.

The rheostat is an appliance used for the regulation of electric devices, and holds the same position in electricity that the valve does in hydraulics. It is simply a compact resistance to the flow of the current with a ready means of cutting out more or less of the resistance by means of a lever. According as the resistance is cut out or lessened, we have an increase in the flow of the current, and the instrument under operation increases its action.

The resistance material in most rheostats is of wire. It may seem strange that the very means by which electricity is carried to us should be used for regulating the quantity which we use. But this has always been the problem with electricians—to conduct electricity without resistance. All metals, while conductors, offer more or less resistance to the free flow of the fluid. A large wire offers less resistance than a small one, and so we find the wires entering our office of large cross section whereby we get a full amount of current, while the wires in the rheostat are quite small or of a material having high electrical resistance.

A problem met with in the construction of wire rheostats is the heat. When the current meets with resistance it produces heat according to the quantity of current flowing and the resistance offered by the wire or conductor so that the ready radiation of the heat is the principal feature of all resistance boxes. The greater the facility for heat radiation, the smaller can be the appliance.

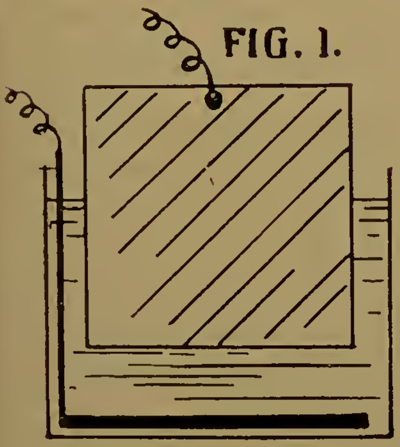


FIG. 1.

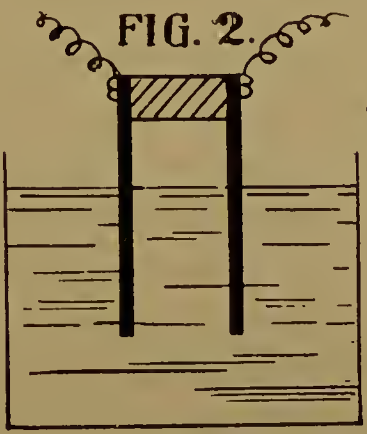


FIG. 2.

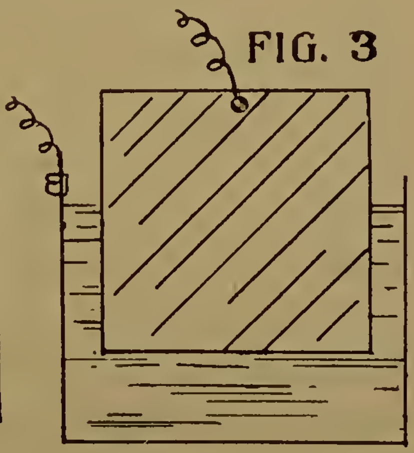


FIG. 3

The form to which attention is called is the water rheostat or the use of pure or somewhat acidulated water as a resistance to the flow of the electric current. Water is itself a poor conductor of electricity, but the ease with which its conductivity can be increased and the flexibility of the appliance, both for resistance and quantity, recommends it. The appliance is simply a vessel filled with water having a metal plate resting upon the bottom, and, by any convenient arrangement, another plate is dipped in the water. One wire is attached to the plate on the bottom and the other wire to the suspended plate, Fig. 1.

In the practical application of this appliance, the plate is lowered into the water, upon touching which the circuit is closed and the current flows from one plate to the other through the water. At the surface of the water but little current is able to flow, but as the plate sinks deeper the current increases in quantity till the bottom plate is touched, where the current flows through the metal and the full current is on.

The appliance just described is not the only form of water rheostat. Both plates may be held together, but electrically insulated, and lowered into the water till they touch a metal bottom. Fig. 2. Or the vessel itself may be of metal with one wire attached to it and the other wire to the movable plate. Fig. 3.

A water rheostat possesses a property not met with in others. It can in a moment's time be arranged to give a large quantity at low voltage, or a small quantity at high voltage. The resistance is varied in three ways; first, by increasing the plate surface in the water; second, by varying the distance between the plates; and third, by acidulating the water. When the plate surface is increased it is the same as enlarging the cross section of a metal conductor. The resistance of wire increases as its cross section decreases. The deeper the plates are immersed in the fluid the greater is the surface they present, so that the resistance decreases with the depth of the immersion, and the operator has only to lower or raise the plates to increase or decrease the quantity of current. By this he manipulates the amperes more than the volts, and since heat in electricity depends upon the quantity or amperes such an arrangement is best fitted for all heating appliances.

By the second method, varying the distance between the two plates, we do the same thing as lengthening or shortening a wire which conducts electricity. The resistance is greatest when the plates are far apart and decreases as they approach. By this arrangement the operator manipulates the volts more than the amperes, or, in common terms, the pressure more than the quantity. For this reason, a water rheostat whose plates are movable to and from one another is applicable in using a low volt instrument on a high pressure current.

The third means of varying the current is by acidulating the water. Pure water is a poor conductor of electricity compared with the metals, but by adding an acid to it, it becomes a good conductor. Nine per cent. acid increases the conductivity of the fluid about 25 per cent. It is not practical, however, to increase the acidity as a means of regulating, but by using the acid a rheostat of large capacity can be made from one of small capacity.

A vessel holding a pint of water would be large enough to regulate a dental motor, a mouth lamp, mallet or gold annealer, and one of a gallon capacity would be sufficient for melting platinum, operating the cautery or electric oven. It should be made so that the plate or plates can be let into the water by steps just as the wire rheostat is operated by passing from button to button. This can be done by suspending the plates on a pulley or by a succession of notches.

The water rheostat, unlike most others, is capable of very fine adjustment, since the current is increased by lowering the plates into the water. If this operation is done by a screw it will give as close gradations for cataphoresis as can be obtained by expensive ones for this purpose. Another advantage over all other forms is that it is fire-proof. There is no spark upon breaking the current and there are no contact buttons to corrode. The contact between the water and metal is always good.

The instrument can be easily made, is inexpensive, and requires no attention but an occasional addition of a little water.

SOAP SOLUTION.

Dissolve one ounce of fine soap (Ivory) in one pint of water.

ALUMINUM SOLDER.

Scientific American.

Its composition is aluminum 1 part, 10 per cent. phos. tin 1 part, zinc 11 parts, tin 29 parts. It fulfills the requirements demanded so perfectly that it is now generally adopted both in this country and Europe.

GOLD AND PLATINUM SOLDER.

DR. W. H. TRUEMAN, PHILADELPHIA.

Dental Cosmos.

The addition of a few grains of platinum to pure gold makes a solder upon which pure gold will readily flow. Upon small work it is well within the compass of the laboratory blowpipe, on account of its high fusing, rather safer in the porcelain furnace.

THE SOLDERING IRON.

DR. F. MESSERSCHMITT.

The soldering iron should be kept in perfect condition, otherwise good results cannot be obtained. A simple method of tinning the iron is, file the copper down to clean surface and shape as desired. Place a small piece of tin or tinman's solder (half and half) on a slab of sal-ammoniac, having iron thoroughly heated; rub it over slab, allowing it to come in contact with the tin till melted; then by a slight rotating motion the iron will tin very readily. It is better to use a tinman's solder for this purpose, as tin alone pits the iron. Care should be taken not to overheat the iron in subsequent use, otherwise the tinned surface will be destroyed. When soldering, care should be taken to have clean surfaces. The soldering fluid (chlorid of zinc), causing rapid oxidation, should not be applied till the iron is hot and ready for use, otherwise good union will not be obtained.

CARE OF SPITTOON.

Ash's Quarterly, December.

Mr. A. W. Wright, of London, finds that a little sulphate of copper sprinkled inside the spittoon (metal or earthenware) before the day's operations commence, prevents any unpleasant odor, does not allow the interior of the spittoon to become furred, and renders it much easier to cleanse than usual.

TO REMOVE BLOOD STAINS FROM OFFICE LINEN.

It is said that blood-stains may be readily removed from towels and napkins by soaking them in warm water to which a teaspoonful of tartaric acid has been added. No soap is needed.

IODIN STAINS, TO REMOVE.

DR. J. C. EMMERLING.

Dominion Dental Journal, November.

A solution of hyposulphite of sodium in water will remove iodin spots from linen, cloth, skin, in fact from everything, almost instantly. The fresher the spots the quicker the action of the hyposulphites.

TO REMOVE NITRATE SILVER STAINS.

DR. J. LEVIN, MELBOURNE.

Ash's Quarterly, March.

For fresh stains—a saturated solution of oxalic acid, after the application of which rinse well in running water.

For old stains—

℞. Hydrarg. Bichlor.
Ammon. chlorid. ....āā gr. cl.
Aq. dest. .... ʒ iij.
Sig. Rub well in with a piece of cloth.

TEMPERAMENTS AND THE RELATION OF TEETH THERETO.

Dental Cosmos, August.

From an article by Dr. A. H. Thompson, of Topeka, Kansas, who quotes from Jacque on Temperaments, the following is presented:

The following signs may be taken as indicating the main characteristics of the leading temperaments by which the most prominent temperament of a person may be recognized, or the binary combination that is most marked when a dual organization is present.

THE SIGNS OF THE BASAL TEMPERAMENTS.

The Lymphatic Temperament.—This temperament is based on the predominance of the lymphatic system, and is characterized by a stature above the medium; fullness of body amounting to corpulence, owing to the activity of the lymphatic system; softness and flabbiness of flesh; contours full but without grace or beauty; articulations voluminous but badly formed; extremities large and ugly; features full, heavy, and expressionless; the cheeks pendent and the lips thick; skin a dull leaden-white, faded or yellowish, and generally cold and moist; hair fine, silky, and soft, but lusterless. Jacque calls this an abnormal temperament.

The Sanguine Temperament.—This variety is marked by the predominance of the arterial system. It is replete with vigor and the healthful activities. There is a stature generally above the medium; a well proportioned body; the muscles and bones formed for elegance and activity rather than for strength. The skin is fine, soft, pliable, and transparent; the complexion ruddy and fresh; the hair blonde, red, or chestnut, rarely dark. The face is inclined to roundness; the lips are full and red, and the eyes blue, brilliant and expressive; the pose of the body is natural and dignified, and the movements graceful, easy, and precise. This splendid organization is characterized by vigor, warmth, and functional activity. This is the vital temperament of Jacque.

The Bilious Temperament.—This temperament is characterized by a medium or tall stature; a somewhat angular configuration; strongly defined muscular development; a strong frame; a lofty, if not audacious, bearing; abrupt, energetic, and expressive gestures; a measured walk, and a serious if not somber expression. The skin is rather coarse and dry; the complexion olive, tawny, or dull; the eyes black or brown, and the hair dark, often black,—strong and abundant. The venous predominates over the arterial system; the excess of bile secreted shows that the liver is the predominating organ of the digestive and nutritive system. It influences the whole organization and constitutes a distinct physical basis. This is the motive temperament of Dr. Jacque.

The Nervous Temperament is a more or less abnormal constitutional condition, and is sufficiently common in this age and in this country as to be readily recognized. It consists in the excessive development and morbid activity of the nervous system, although the brain, taken alone, is not always necessarily either large or particularly influential, the nervo-ganglionic system being the chief seat of this constitutional condition. The physical indications of the nervous temperament are: a stature below the medium; a slight frame; habitual emaciation due to weakness of the nutritive system; a marked predominance of the nervous over the muscular system. The head is relatively large, and there is more or less marked disproportion between the cranium and the face. The skin and hair are fine and soft; the eyes often gray and very brilliant; the complexion pale and sometimes sallow; the movements rapid and often irregular and convulsive; the expression intelligent and vivacious. Dr. Jacque considers this one of the abnormal temperaments, but its characteristics must be recognized even though its tendencies may be pathological.

The basal temperaments never occur, however, in any one individual alone without admixture of other elements in greater or less proportion. These are sub-classes of the four bases, of mixed temperaments, combinations of the primary divisions. In these combinations one or more of the so-called basal temperaments predominates,and a compound term is used to express the complexity. The compound or binary temperament is most common in which two of the basal temperaments are well marked, with which may be characteristics of one or two others combined in greater or less degree. The two leading bases name the compound,—as the sanguino-bilious or the bilio-lymphatic, etc. The names of these compounds are sufficiently indicative of their characters as combining the leading features of the two bases named. The list of the double compounds extend throughout the entire series of the temperaments in all possible combinations. But to these binary compounds are usually added touches of other temperaments also in varying proportions, although tertiary combinations cannot be positively diagnosed or described. Therefore we must content ourselves with going no further than the binary combinations.

THE TEMPERAMENTAL CHARACTERISTICS OF THE TEETH.

As other parts of the human organism are profoundly affected by the influence of temperament, it is to be expected that the teeth would also follow the rule and exhibit features characteristic and indicative of the temperaments. Extensive study by careful observers has demonstrated this to be a fact, and significant signs have been noted and classified which are now known to accompany each temperament. These can be briefly catalogued as follows:

The Lymphatic Temperament.—The teeth of this temperament are large, ill-shaped, short, and broad; the cusps low and obtuse; the edges thick and rounded; the enamel dull, waxy, and opaque in finish; the coloring dull, muddy, pallid, and lusterless. The articulation loose and flat; the arch large and round; the vault low and flat; the gum margins thick and loosely defined; the color of the gums pale, and the texture soft.

The Sanguine Temperament.—The teeth are symmetrical and well proportioned, with curved and rounded outlines; full round cusps and well-defined edges. The parts of the teeth are clearly marked. The enamel is brilliant and translucent, with a bisque-like finish. The color is rich cream, inclined to yellow. The articulation is firm and sharp; the cusps interlocking well. The horizon of occlusion is inclined to curve—i. e., to dip downward at the bicuspids and first molars. The arch is the round square, the cuspids standing out at the corners sufficiently to give character to the arch; the incisors describing a slight curve from cuspid to cuspid, and the bicuspids curving gracefully backward and outward from the cuspids. There is some tendency to irregularity, especially when crossed with the nervous temperament. The gums are of a good healthy pink color, clear and bright, the margins well defined, and the health-line well marked.

The Bilious Temperament.—The teeth are large and angular; rather long than broad; inclined to transverse lines; the anatomical features of the crown strong; the cusps and edges long and stout. The enamel is strong and thick, but rather dull, rough, and unpolished. The color is a strong bronze-yellow in various shades. The articulation is firm and close, and the cusps well locked. The plane is much curved, the dip being considerable. The arch is square, the cuspids standing out boldly at the corners; the incisors line being flat and the bicuspid and molar line dropping straight backward from the cuspids. The vault is deep and square. The teeth are closely set, but there is not much tendency to irregularity. The gum is red and heavy, and the margins thin and congested.

The Nervous Temperament.—The teeth are marked by delicate beauty of form, but with lack of solidity. There is excess of length in proportion to width; the cusps and edges being long, fine, and thin. The enamel is brilliant, translucent, and weak. The color is pearly blue, inclined to gray. The articulation is long and penetrating; the line of occlusion very irregular. The arch is inclined to the "V" shape from contraction and weakness of the bones of the face. Irregularity of the teeth is prevalent in this class, and abnormalities of all kinds are common. The vault is high and contracted, the "Gothic Arch" being the form of both the arch and the vault. The gums are thin, pale, anemic, and glistening; the margins thin, pale, and loose.

THE BINARY COMPOUNDS.

The Sanguino-bilious.—The teeth are large, with strong edges and heavy cusps; the color dark yellow, a combination of the characters of both bases.

The Sanguino-nervous.—The teeth are of varying size, shapely; inclined to length with narrow necks; brilliant enamel of bluish-cream color. There is much disposition to irregularity.

The Sanguino-lymphatic.—The teeth are of more than average size; broad and well rounded; color, cream-gray inclined to yellow, dull and opaque.

The Nervo-bilious.—The teeth are long and narrow, with long cusps; the enamel polished; the color a combination of bluish and yellowish shades in various degrees.

The Nervo-sanguine.—The teeth are of average size, finely rounded; good and shapely edges and cusps; brilliant rich cream color, inclined to bluish shades.

The Nervo-lymphatic.—The teeth are above average size and length; of good shape; the color bluish-gray and texture chalky. The arch is round.

The Bilio-nervous.—The teeth are as variable in size, form, and all other characters as can well be imagined; in some they are broad and shapely, in others long and narrow. The necks are often narrow. The color is blue or yellow, but dark. The cusps are usually long. The arch presents curious combinations of the square and V-shape, with varying abnormalities of form and disposition of irregularity of the teeth.

The Bilio-sanguine.—The teeth are of average size, finely shaped, with well-developed and shapely cusps and edges; rich, dark cream color or bright yellow. The arch is of good form, the round-square.

The Bilio-lymphatic.—The teeth are of large size with thick edges, short thick cusps; the color yellowish; the enamel bright or opaque. The arch is round and the articulation flat.

The Lymphatico-sanguine.—The teeth are of more than average size, with shapely edges and cusps; color grayish-cream, inclined to muddiness. The arch is round and the articulation flat.

The Lymphatico-bilious.—The teeth are of average size; good shape; heavy, well-developed cusps and edges; of a rich dark-cream color, inclined to orange. The arch is round-square; the articulation close and firm.

The Lymphatico-nervous.—The teeth average less than the usual size; are of shapely form with long cusps and edges; color grayish-blue, inclined to opaque-white. The arch is round V-shape; the articulation deep. In general, the characteristics are very irregular.

REMEDY FOR THIRST.

Medical Times.

Thirst and great dryness of the mouth in sickness is often relieved by a teaspoonful of powdered gum arabic, beaten thoroughly with a couple of teaspoonfuls of glycerin, to which is added a glass of cold water and enough lemon juice to make the mixture palatable. The mixture may be taken freely, with great relief to the dryness of the mouth and thirst.

HOWARD'S BALSAM VARNISH FOR CAVITIES.

Dental Practitioner and Advertiser, January.

Dr. Howard's Antiseptic Varnish for coating cavities preparatory to filling consists of Canada balsam, to which has been added mercuric-chlorid and thymol, evaporated over a water bath from twenty to twenty-eight hours, and finally dissolved in chloroform. The proper consistency can only be determined by experience and careful observation, and it is upon this that its usefulness depends. When improperly prepared it is valueless. It is not, of course, intended to retain fillings, but to aid in their adaptation, and to act as an anti-thermal and protective coating.

COLORED SANDARAC VARNISH.

DR. J. G. HARPER, ST. LOUIS, MO.

Items of Interest, April.

To make sandarac varnish, put five ounces of sandarac into one quart of alcohol. To color, add to the alcohol sufficient red anilin to give a rich claret color.

WAX SHEETS, TO MAKE.

DR. E. H. KEITH, RHINELANDER, WIS.

Written for The Compendium.

Melt scrap wax in water, add a little sulphuric acid, half dram to the pound, boil two or three minutes; when cool, separate the collection of refuse from the bottom of the cake, boil again and add a few drops of turpentine, which will toughen it. When the foam ceases, it is ready for rolling into sheets. Wet the glass rolling-pin, or bottle used as such, and coat with soapstone. To get the desired thickness and width of sheets, lay straight wire the size of thickness desired as far apart as the width desired. Roll the pin over the wires; they will mash into and through the wax.

TO REMOVE HARD LUMPS IN CORUNDUM WHEELS.

DR. J. K. MOOSE, LENOIR, N. C.

Items of Interest, June.

Make a sharp drill of a broken or worn-out excavator or plugger, then heat and apply it to the hard place in wheel; at the same time turn the drill back and forth. The heat softens the shellac and the motion works it out.

SCIENCE IN DENTISTRY.

Edited by **HENRY H. BURCHARD, M.D., D.D.S.,**
Philadelphia.

The dental journals of 1896 were rich in articles dealing with scientific subjects, and a digest of them would fill an entire volume larger than this. Only those articles have been reviewed for this department which are entirely new, and present distinct scientific discoveries. Where possible, these essays have been digested so that the distinctively new portions should alone be extracted, excluding all else.

With the work of Dr. Black, extensive condensation is an impossibility, as the results of his labors are presented as recorded facts, not defined generalizations.

The researches of Dr. Williams were presented as an outlined thesis, the body of the essays being masses of corrobative and incontrovertible evidence which made possible the condensation of a series of essays, which should be reread in the original with the accompanying illustrations.

So with the other essays, the results of the labors of investigators have been generalized where admissible and condensed where generalizations are not advisable.

HENRY H. BURCHARD.

THE DENTAL NERVES AND THE MANNER OF THEIR TERMINATION.

GUSTAF RETZUIS,
Professor of Histology in Karolinska Medico—Kuirg Institutet.

Translated for The Compendium by Ernst Sjöberg, Stockholm.

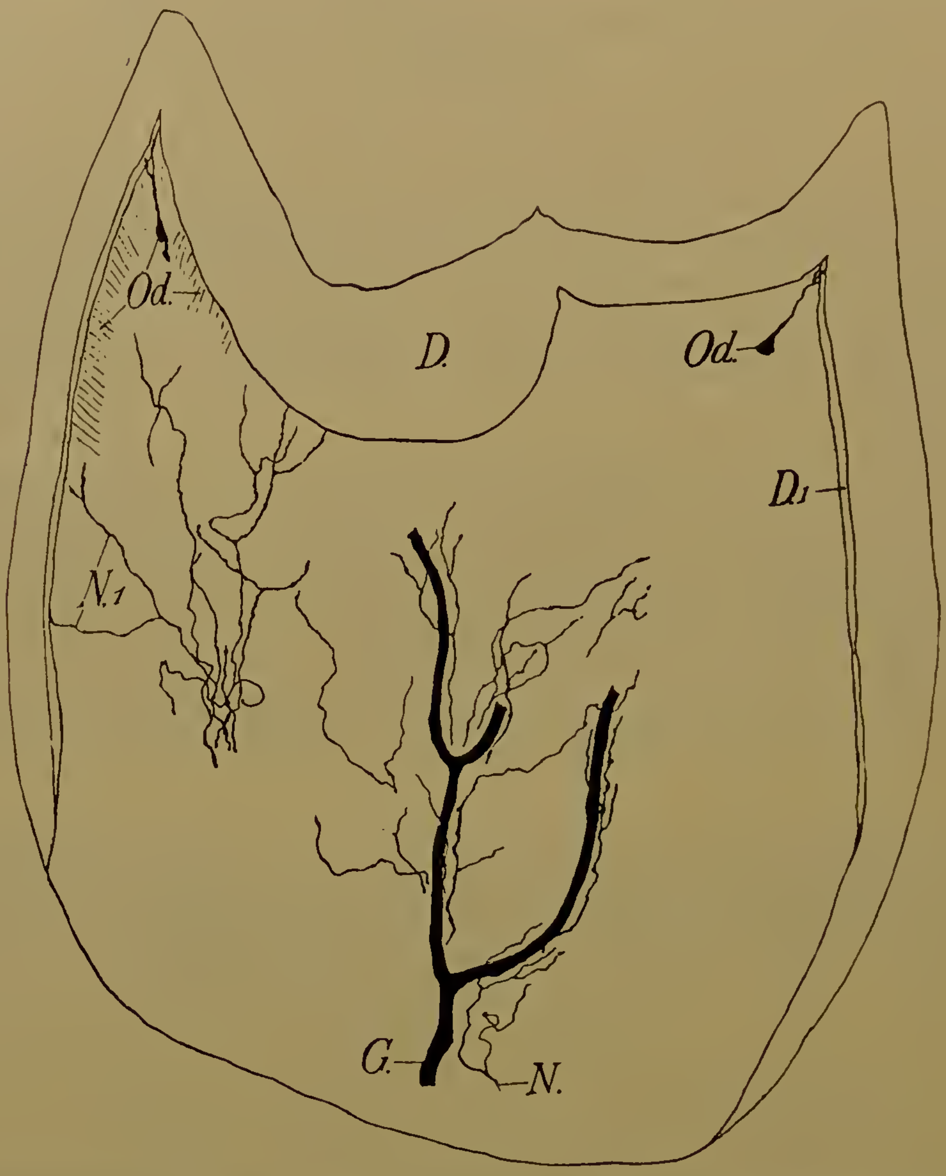
The writer reviews the evidence as to the sensitivity and hypersensitivity of the dentine, and alludes to Tome's demonstration that the dentine is penetrated by the cell processes of a layer of boundary cells (the odontoblasts) covering the periphery of the pulp, and that these filament are not nerve fibrils.

Dr. Retzuis sets aside as faulty observation, the opinion that nerve fibrils penetrate between the ondotoblasts and pass thence into the dentinal tubules.

Staining with chlorid of gold gave negative results. Von

Ebner (who prepared sections with this stain) regarded it as doubtful whether the nerve fibrils passed into the layer of odontoblasts.

The author has experimented extensively with the Golgi method of staining that which gave such remarkable results in the study of the central nervous system.



G—Blood-vessel of the pulp. N—Fine nerve trunks. N—The branching of the nerve trunk at the surface of the pulp. Od—The odontoblastic layer is only defined by five parallel lines. two odontoblasts stained black are exhibited. D—The dentine. D—The youngest uncalcified dentine

By means of this method of staining (the chrome, kalium-osmium-silver) nerve fibrils are stained dark-brown to black. The dental nerves of the teeth of higher mammals do not appear to respond well to this stain. I have had favorable results in using the teeth of fishes, amphibious animals and lizards, and also those of young mice. Young mice about a week old are selected, as the dentine and enamel may be cut with a knife.

Sections of such teeth stained by the Golgi methods have portions of the blood-vessels and also the odontoblasts stained black. The nerve trunks appear to follow the blood vessels interlacing about them, and branching out toward the periphery of the pulp. The terminal nerve branches pass between the odontoblasts and lie between them and the dentine, but there is no appearance of their penetration into the tubuli. The nerve terminals are in fine filaments, but sometimes present a knotty, varicose appearance at their ends.

Although it has not yet been demonstrated that the nerves of the tooth pulp terminate in the same manner it is extremely probable that they do so.

The appended cut represents a vertical section of a tooth of the mus, musculus, the domestic mouse, six days old.

PRACTICAL UTILITY OF ACCURATE STUDIES OF THE PHYSICAL PROPERTIES OF THE TEETH AND FILLING MATERIAL.

G. V. BLACK, M.D., D.D.S., D.S.C.

Dental Cosmos, April.

In the work upon the teeth the points covered were: 1st, The variations in the percentage of lime-salts in the human teeth. 2d, The relation of these variations, if any, to the diseases of the teeth, especially caries, but including diseases of the peridental membranes, and the supposed loss of lime-salts, softening of the teeth in women during the period of child-bearing. 3d, The relation of the percentage of lime-salts to the strength of the dentine, and to the strength of the teeth. 4th, The force used in ordinary voluntary effort in biting and in mastication, and the relation of this force to the strength of the teeth. It did not include possible variations in the composition of the lime-salts. It did not include variations in the hardness of the teeth to cutting-instruments.

The results show the percentage of lime-salts in the human teeth to be very uniform. The slight variation found bears no relation whatever to caries of the teeth; it has no relation whatever to diseases of the peridental membrane. The percentage of lime-salts in the teeth of women is not reduced during the period of child-bearing. The percentage of lime-salts bears no very constant relation to the strength of the teeth as tested by pressure upon blocks of dentine.

This investigation does not clear up the mystery which still prevents an explanation of the reasons why some people are very susceptible to caries, while some are less susceptible, and still others are wholly immune. But it does clear up a grave misconception as to these differences, for heretofore it has been the habit of thought of many in the dental profession to attribute these differences in the susceptibility of persons to caries of the teeth to differences in the relative proportion of lime-salts they contain.

Teeth that are rapidly decaying are as apt to be well calcified, strong and dense as teeth in which no decay appears. The facts are that rapidly decaying teeth, even those that may be poorest in lime-salts, are sufficiently hard for any kind of filling operations. The contention is not that the teeth are equally hard and dense, as will sufficiently appear later, but that these differences bear no relation to their diseases. We know that the active cause of caries does not exist within the tooth, but is from without, acting primarily upon its surface, and does not appertain to differences in its structure. Differences in susceptibility are, in all reasonable probability, from without also, and are conditions that are now well known to be variable or changeable. It is certain that many cases of the condition of rapid decaying teeth, when occurring in young persons, disappear with increasing age if the proper efforts are made to limit the damage done.

Any fissures or imperfect closure of the lines of junction of the enamel plates, pitting of surfaces, bad forms of the interproximate spaces, etc., give opportunity for caries. Interglobular spaces occurring in the dentine, or other forms of abnormal openings in their tissues which favor rapid ingress of micro-organisms, serve to increase the rapidity of caries.

Whenever hardness or softness of the teeth is mentioned, it has been with reference to the prevailing expression of hardness or softness as expressing the idea of more or less perfect calcification, or with reference to the ability of the dentine to withstand heavy pressure without crushing. It has not had reference to the behavior of the teeth before cutting-instruments. I am finding in practice that which appears to be very considerable differences in the hardness of teeth to cutting-instruments. I am persuaded that in many cases men have mistaken for normal dentine dentine softened by partial solution of the lime-salts.

The strength of the teeth under stress is sometimes very different from their hardness before cutting-instruments, and probably not at all correlated.

The weakest dentine found, living when the tooth was removed, bore a stress of one hundred and ninety-five pounds on a block .085 x .085 x .085 of an inch, which equals two hundred and seventy pounds on a block one-tenth of an inch square, the size of the experimental gold fillings made for examination. The strongest of these fillings was shortened two per cent. by a stress of two hundred and fifty pounds. In other words, that hardest of gold fillings can be crushed out of all semblance of its original form upon a block of dentine from the weakest human tooth, without injury to the dentine. This is enough to say about teeth "too soft for gold fillings."

We are not justified in making a gold filling immediately for a sensitive child, simply because the tooth is sufficiently strong. The condition of the pulp of the tooth may not justify such a course, or even the dentine may be too sensitive. It must be remembered that we operate on a living tissue, and, though the tooth itself is always hard enough, its condition and the surroundings must have due consideration.

The most serious hindrance to the proper condensation of gold fillings is found in the condition of sensitiveness of the peridental membranes. From the examinations made I conclude that in a state of nature—that is, living upon foods presented in the natural state—man would be able to close his teeth with a force of from two to three hundred pounds. But in the conditions of civilization and the artificial preparation of food stuffs the peridental membranes are generally not accustomed by usage to such severe stress, and, for this reason, the amount of stress that will be borne by the individual tooth without severe pain or even injury, is often reduced to one hundred pounds, or even less, in a state of apparent perfect health. Theoretically, the peridental membrane of each individual tooth should be able to sustain it against the entire muscular strength of the jaws, for otherwise they would continually be liable to injury. This is certainly true of the animals generally. But the study of this point in man has led to a conclusion that from the use of soft foods habitually, the peridental membranes are so weakened, or have become so sensitive that they will not bear this stress, and that in the use of his teeth man continually limits his muscular exertion to the amount of force productive of pain in the peridental membranes; therefore, a little more force than that usually required by the food he uses is productive of pain. This has been generally true in trials of the force of the bite, and gives rise to the wide variations noted in my papers.

This fact should be kept strictly in mind in all dental operations requiring much force. It often happens that teeth requiring fillings have been sensitive from exposure of the dentine, and, for that reason, their use in chewing food has been avoided for some time; such teeth are sensitive to the mallet by reason of changes in the peridental membrane occurring because of disease. If these be filled temporarily with some plastic for the relief of sensitiveness, and the patient directed to bring them into full use, and gradually to something more than full use, accustoming the peridental membranes to bear heavy stress, they will be found, after a few weeks or months, to bear the mallet with little or no pain. This is a practical point of great worth in the treatment of children as well as adults.

The anchorage of bridges with broad molars on small bicuspid roots also comes in for consideration along this line of thought. I have already witnessed the absorption of several roots of bicuspids which was clearly attributable to the over-stress upon a bridge too large for the sustaining power of the membranes depended upon.

The object of experimental studies of the physical properties of gold now in hand is, first, to establish the correlation that exists between the strength of gold fillings, the teeth in which they are placed, and the stress brought upon them in mastication. In these days the engineer must know how to apportion the strength of his material to the load it must bear. Dentists should become able to adjust the strength of fillings to the stress which shall come upon them in mastication, and be able to teach this in some definite demonstrable way to students.

Now, what has been shown? First, that as between gold, as made into fillings, and the teeth, the teeth are harder and stronger than the gold in all cases that have come under my instrumental observation. That the teeth are harder than cast or hammered gold; that we can in teeth make gold fillings that are hard enough to withstand the pressure of any ordinary stress of mastication; that we often do, many of us at least, make gold fillings that are frail, too frail to serve the purpose intended. It has also been suggested that there are certain means at our command by which, if properly used, this can in large measure be prevented.

Among the fillings presented to me from members of this society, made in steel dies for experimental purposes, there are wide variations in density and rigidity, or in weight and endurance of stress. The densest filling reached 18.47 volumes out of a possible 19.4, the measure of absolute density. The strongest filling required two hundred and fifty pounds to reduce its length 2 per cent. The lightest filling reached only 12.53 volumes, and fifteen pounds' stress reduced its length 2 per cent. In other words, the one has a density of 95.2 per cent., while the other has a density of a little less than 65 per cent. This variation must be regarded as very wide. This is as good a list of experimental fillings as any I have obtained, in some respects better; and for fear some one should overlook it, I say emphatically that the instrumental test which I report is but one, and not really the most important test of the worth of a set of fillings. The die, or mold, in which these fillings are placed, has been carefully polished with emery, which has left fine lines upon its interior surfaces in the hardened steel. A filling which has been perfectly adapted to these walls in all of its parts will show these lines unbroken upon its surface. Without this adaptation in very fair degree, a filling is inferior no matter what its density or strength.

In the count of excellence in operating this is, and must always be, the first count. While density and rigidity must ever remain secondary to adaptation, it still holds that rigidity is a necessity to endurance, and it is especially the degree of rigidity attained, and attainable, that is the subject of this investigation.

In twenty-four experimental fillings there are five that reach a density of eighteen volumes or over. These are remarkably heavy fillings, but not heavier than produced experimentally by means which are in the mouth. Yet in later experimental work I have been led to doubt whether or not the malleting might be overdone, that is, a degree of force used that was inapplicable in actual work in the mouth. It is easy to do this in experimental work out of the mouth, and in this way bring about a deception. One gentleman who furnished me with very dense fillings remarked that it was his habit to lay on the pressure until his patient winced.

On the other hand, one gentleman who has furnished me with some of the lightest fillings in the group, as well as one among the heavier, stated that it was his habit and effort to fill the cavity with the least practicable amount of gold, "caring more for adaptation and finish than for density and strength." One of his fillings reached a density of but twelve and one-half volumes, and was shortened two per cent. by fifteen pounds' stress, and five per cent. by thirty-five pounds. A filling so frail as this will be condensed upon itself (compacted into smaller compass) by the stress of mastication in the chewing of beefsteak, and if the surface alone is made hard by malleting cohesive gold upon it, as suggested, the margins will fail to readjust themselves anew to the margins of the cavity; the filling, if not pushed out of position entirely, will absorb animal matter, and caries will inevitably recur. Experimental research has taught me a new view of this point. A filling wholly of non-cohesive foil, if confined by four walls, may be frail and may condense upon itself, and still the margins are so soft and adaptable that the force which condenses it continally secures the readaptation of the margins. Frail fillings veneered with cohesive gold lose this property, and soon become valueless. It is clear then that if the filling is to be made mostly of truly non-cohesive gold, unless it is very well compacted, it is better to finish it with non-cohesive gold.

The difference between cohesive and non-cohesive fillings, when placed under stress, has been so pronounced that there is no mistaking the one for the other. A truly cohesive filling of fair density acts precisely as cast or hammered gold, enlarging in circumference as it is shortened, its sides remaining smooth. Non-cohesive fillings, on the other hand, break and split up, showing ragged sides, the natural result of non-cohesion. This raggedness may be in some degree lessened, but not prevented, by laying the folds, cylinders, or blocks flat instead of placing them on end in the cavity. Here I should state the proposition that non-cohesive gold fillings are adapted only to cavities with four good side-walls, and that they depend for their strength upon the lateral support of these walls, therefore pressure tests of the naked blocks do not give a proper or correct estimate of their strength. At the same time, if their density is so low that they will be considerably condensed upon themselves by the stress of mastication, they must become inefficient as fillings, especially so if veneered with cohesive gold. Still, a frail non-cohesive filling must always be better than a frail cohesive filling, and this is an important pointer in the treatment of occlusal surfaces for children, in cases where the most efficient force cannot be used. A cohesive filling that is condensed upon itself by stress of closure of the jaws must inevitably lose its marginal adaptation, while a filling made wholly of non-cohesive gold does not necessarily do so. This does not apply to non-cohesive gold fillings veneered with gold when the density and strength is sufficient.

I wish to be clear in conveying the meaning of the expression, "condensing upon itself"; a filling low in density, even the naked block, will, when pressure is brought upon it, shorten in length without increasing in transverse diameter; this I call condensation upon itself; the gold is simply rendered more compact. This will occur to a certain degree, and then the transverse diameter will begin to enlarge, and for a time the two will go on together. Even four good walls is no protection to such a filling against condensation, or, if of cohesive gold, against loss of marginal adaptation. The degree of density required to completely overcome this is not certainly determined, but with cohesive gold it is in the neighborhood of a density of fifteen volumes. A lower density than fifteen is inadmissible in any gold filling, whether of cohesive or non-cohesive gold. It must be recognized that fillings exposed to the stress of mastication require more rigidity than those not exposed to stress.

The question has been put repeatedly, "Do these experimental fillings correctly represent the density attained in fillings placed in teeth?"

The average specific gravity of the experimental fillings was 16.48, while the average specific gravity of the old fillings tested was 15.94, a difference of fifty-four one-hundredths of a volume. However, I have since received six more experimental fillings, all of which are of very high specific gravity, and this places the experimental fillings eighty-five hundredths of a volume heavier than the old gold fillings.

I find that fillings of the density of 15 and below are liable to absorb organic matter. They contain twenty per cent. or more of air-spaces. Of course, the surface of such fillings may be rendered impervious in the finishing, but if a leak occurs moisture enters more or less into the substance of the filling.

It is certain that the differences in density seen in these lists of fillings is due in but small degree to the amount of physical force used in their condensation. Differences in rigidity are more directly due to the force used.

To make a very dense filling does not require very heavy malleting, but does require that the gold be used in thin pieces, carefully and evenly laid, and that the malleting be complete over the surface of each piece; such a filling will not be very hard.

To make a hard rigid filling does require heavy malleting in addition to care in the laying of the gold, if the filling is to show great density as well as rigidity.

A very dense filling, one of high specific gravity even of cohesive gold, may be soft, and will yield readily to stress, if the malleting has been light; while on the other hand, a filling that has been made very rigid by heavy malleting may be of less density because of less care in the placing of the gold, or from using the gold in pieces that are too large, causing numerous air-spaces to be bridged over. Again, heavy malleting with a small point may cause the instrument to pit the condensed gold deeply, and many of these pits will be bridged over, which will reduce its specific gravity. Cast gold, if the ingot has been well formed, cannot be greatly increased in density by hammering, but its rigidity is greatly increased. Anneal it, and the increased rigidity is gone at once without materially changing the density. The hammer will restore the rigidity. By the use of our mallet and plugger points, malleting the gold into the cavity bit by bit, we are enabled to make pure gold more rigid than it can be made from the ingot upon the anvil with the hand hammer.

To make a very dense filling, the plugger-point should be proportioned to the force of blow employed. It is difficult to express this proposition, for the reason that no means has been developed of measuring the force of blow. Even the mechanical mallets are too variable, one with another, to serve as a safe guide. With the blow I habitually use in operating, I find I can obtain the densest filling with a plugger-point about two one-hundredths of an inch square—i. e., an area of four one-hundredths of an inch. A smaller point pits into the gold too much, so that these pits bridge over. With larger points the condensation diminishes with the increase in size, unless the force of the blow be increased in proportion. If in any case the malleting must be reduced in force, the size of the point must be reduced, if the density is to be kept up to the standard.

In order to utilize the density and rigidity of filling-material to the best advantage, certain rules as to the preparation of cavities must be observed. We cannot make a cone, set it on its small end, and apply stress to the larger end, and expect the small end to support the stress that would be borne if the form was of one size from one end to the other. It will inevitably be condensed at its smaller end. We can no more support occluso-proximate fillings that present broad surfaces to the occlusion upon a narrow shelf for a seat at the gingival wall, than we can make the cone support heavy stress upon its little end. If we would have our occluso-proximate fillings stand, we must broaden the seat of the filling which must support the structure to such an extent that it may bear the load that will be brought upon it. To do this, an additional seat must be cut in the central part of the crown of the tooth. Strict experiment as to the strength of gold shows this too plainly for any mistake to be made, and when it is generally done, and the gingival walls made flat and broad and the interproximate space of proper shape, the difficulty of making proximate fillings stand will mostly be a thing of the past.

It isn't anchorage that needs such close watching, but something upon which the filling may rest with broad enough base so that it may not be condensed upon its seat. When this is done, but little further anchorage is required.

EXPERIMENTAL STUDY OF THE DIFFERENT MODES OF PROTECTION OF THE ORAL CAVITY AGAINST PATHOGENIC BACTERIA.

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Dental Cosmos.

I.—BACTERIOLOGY OF THE NORMAL BUCCO-PHARYNGEAL CAVITY.

The mouth, which is continuously in contact with the atmospheric air, the food and drinks presenting on one side the conditions of heat, moisture and perfect alkalinization, is the receptacle of a considerable number of species of micro-organisms. As most of them are inoffensive saprophytes, essentially variable according to the individual, the ingesta and the moment at which the examination has been made, that class will not be herein considered. Others, on the contrary, have acclimated themselves and constitute the buccal flora.

The mouth, although very favorable to the cultivation of microbes and possessing a great number of bacteria belonging to pathogenic species, is not very septic, and most of the micro-organisms that are encountered in the normal state are in the saprophytic state and very attenuated. This is a general state of affairs, and a rapid study of the degree of virulence of germs on the surface of other mucous membranes shows us also that the microbes found are attenuated as regards their virulence, and reduced to saprophytes.

In the nasal cavity, although less numerously than in the mouth, are found a great variety of microbian species, pneumococcus, staphylococcus, streptococcus, pneumo-bacillus, etc., species which have lost their virulence, as has been shown by Wurtz and Lermoyez, attenuation which is attributed by them to the bactericidal action of the nasal mucous.

Whatever be their seat, the germs which are profusely disseminated on the surface of the different mucous membranes possess a very feeble virulence, and always the same causes seem to act to bring on this attenuation, bactericidal properties of the fluids of the body, vital antagonism of bacterial species; finally, the phenomenon of leucocytosis, which takes place in the interior as well as on the surface of the mucous membranes. These different causes of protection we shall find in the buccal cavity.

II.—EXPERIMENTS AS TO THE BACTERICIDAL PROPERTIES OF THE SALIVA.

The first hypothesis which presents itself is: Are the microbes of the mouth, like those of most of our natural cavities, not attenuated by a bactericidal action of the glandular secretions, here the saliva?

The first research on the bac*t*ericidal action of the saliva are due to Sanarelli.

His conclusions are: 1. The human saliva must be considered as an entirely unfavorable ground for the development of certain pathogenic micro-organisms, such as the staphylococci, the streptococcus, the tetragenus, the Eberth bacillus, and the cholera spirillum.

2. If the number of micro-organisms is not large, after a long period of resistance they finally disappear.

3. Certain varieties continue to develop, the pneumococcus, for example; but this microbe, if its vitality is preserved, is modified in its form and its virulence is greatly attenuated.

Miller objects to Sanarelli that it is not astonishing if the filtered saliva is an unfavorable medium of culture for micro-organisms, as it contains only 0.15 per ·100 of organic matter, while the non-filtered saliva, as it exists in the oral cavity, contains a very great quantity of nutritive matter—e.g., epithelial débris, mucus, exudates, etc. As to the attenuation of the virulence of the pneumococcus, it does not prove, according to Miller, the action of the saliva, for this microbe is so delicate that in any ordinary artificial medium it would lose its virulence, as well as in filtered saliva.

Miller, moreover, does not believe in the bactericidal properties of saliva, and thinks that the relative immunity of the oral cavity is due to a special power of resistance of the gums.

That experimenter has even inoculated a series of one hundred and eleven white mice with variable quantities of non-sterilized saliva; ten only resisted the inoculation, all the others died from different infections. On the other hand, Galippe has found microbes constantly in the excretory ducts of the salivary glands. All these facts are not much in favor of the bactericidal action of the saliva.

To test this bactericidal action of the human saliva, I have undertaken a series of experiments.

The saliva is collected on rising in the morning, and distributed in sterilized test-tubes. This saliva is divided into two parts; one is filtered with the Chamberland filter, while the other is simply filtered through ordinary filter-paper.

Whatever be the mode of filtration of the saliva, we have found by our experiments that the bactericidal property is the same; consequently, we finally only employed the saliva filtered with the Chamberland filter, the only process by which the filtered liquid is rendered absolutely free from germs. The saliva is then distributed in a series of small test-tubes, each containing two cubic centimeters. Some of the small tubes are then contaminated with a platinum loop of a culture of staphylococcus aureus. The tube is carefully shaken, and we then immediately take a loop full of this contaminated saliva and dilute it in a liquid gelatin tube, which is poured into a Petri box.

With other tubes of saliva we do the same operation, but, instead of taking a platinum loop of the contaminated saliva immediately after the contamination of the saliva with the staphylococcus, we take it one-half hour, one hour, and finally twenty-four hours later respectively, leaving the contaminated tubes in the meantime in the incubator at 37° C.

We know, since the experiments of Nuttal and Nissen, that the normal blood possesses bactericidal properties, or, more exactly, that a number of germs placed in that medium disappear without developing themselves. This bactericidal property, like the toxic or vaccinal properties of certain toxins, is extremely frail, and does not resist heating to 55° C. It then became interesting to verify for the saliva the comparative action of the non-heated saliva with the heated one, and to observe if the latter had kept its bactericidal properties. The deduction from the emperiments is that the bactericidal action of the saliva appears to be very problematical. We have never been able to observe it in an evident manner on any of the microbes except the torula and staphylococcus aureus. In numerous cases the microbes introduced in the saliva develop rapidly, so that their number after a very short time is much more considerable. Sometimes one observes in the beginning a certain slowness in the growth, or even one observes the destruction of the microbes introduced, but we must not forget that the very fact of transporting certain microbes from one medium to another is enough to partially destroy them; the development is interfered with on account of osmotic phenomena.

The experiments of Hafkine have shown that the infusions die rapidly if they are carried from one quality of water into another slightly variable in its chemical composition. The same author has shown that the bacillus of typhoid fever when accustomed to a medium not ordinarily favorable to its development grows with very great difficulty when brought back to a medium much more favorable to the species—e. g., to peptonized broth.

If in our experiments there is seen a certain bactericidal action, it is found not only in connection with the non-heated saliva, but also in connection with the saliva heated to 60°, which liquid is devoid of the bactericidal principles analogous to the one of blood-serum. We may even go further. We have found for the torula and staphylococcus that the saliva heated to 60° has a bactericidal property superior to the non-heated one. There is then no possibility of establishing a comparison between the supposed bactericidal power of the saliva and that of the blood-serum.

A close study of immunity has shown already that the bactericidal properties of the serum cannot explain the resistance of animals against the introduction of virus. We are then forced and authorized to conclude that the immunity of the oral parietes against infection is not due to a germicidal property of the saliva.

Mechanical Action of the Saliva.—If the saliva has not, through its bactericidal properties, the importance which some authors have attached to it, its function in the protection of the buccal cavity is considerable.

The secretion of the parotid and that of the other salivary glands has, in fact, an important use; it acts by diluting the bacteria, gluing them together and rejecting them from the pharyngeal cavity into the stomach, where they are destroyed by the gastric juice.

In all diseases where the salivary secretion diminishes, in cachectics, in infectious states, the mouth becomes dry, the lips also, and the bucco-pharyngeal cavity, ordinarily so well protected, becomes the entrance door, the most important one, perhaps, for secondary infections.

The saliva, as has been pointed out by Mendel, Joseph, Frey, and Sauvez, plays another important part; it dilutes the alimentary particles, prevents their stagnation in the oral cavity, and therefore their fermentation; it prevents also fermentation by its alkaline reaction.

Action of the Buccal Mucus.—It would also be interesting to study in the oral cavity the part played by the mucus secreted by the innumerable microscopic glandules of the mucous membrane. This mucus must play an important part when the salivary secretion is suspended. One observes, in fact, if one of the salivary ducts be kept closed, a hypersecretion of the mucous glands, especially of the palatal glands. If the palate has been well dried beforehand. one can see after a few seconds a great quantity of small drops of mucus, which soon unite. This secretion is especially active during the night, to replace the secretion of the salivary glands which is then suspended. In a great number of subjects, when the secretion of the saliva is suspended during the night the oral mucus has an acid reaction. This acid action is especially marked in arthritics, rheumatic, gouty patients, as was indicated long ago by James Truman, in those patients in whom one finds erosion of the teeth.

We are convinced that this mucus plays an important part and that it is even bactericidal, but, to our great regret, we have not had time to carry on those experiments, and can only reason by analogy.

Let us remember the bactericidal part attributed to the mucus by Wurtz and Lermoyez. After three hours' contact with the nasal mucus at thirty-eight degrees, the spores of the bacillus anthracis are killed, while the staphylococcus aureus, the streptococcus, and coli-bacillus are greatly attenuated.

There exists then on the surface of the mucous membrane a permanent liquid exudation analogous in constitution of the blood-plasma, and which certainly possesses some of the bactericidal properties of the serum.

All these bactericidal actions perhaps play a rôle in the attenuation of the virulence of the germs of the oral cavity, but are not sufficient to explain the relative natural immunity which it presents against bacterial infections.

Action of the Potassium Sulfocyanid.—We know that the real presence of this salt in the saliva has been doubted by several experimenters, among whom are Berzelius, Lehman, Claude Bernard, the latter even attributing its presence to dental caries. Longet and Schiff, however, indicate it as a constant element of the human saliva in proportions varying from 0.10 to 0.20 to 1000.

Longet found it constantly in the saliva of the submaxillary gland as well as in that of the parotid and sublingual, in variable proportions according to the concentration of the salivary liquid, but there is no relation between the pathological state of the teeth and the presence of this salt. The question has been raised, whether the potassium sulfocyanid did not play the rôle of a salivary antiseptic agent. To verify this hypothesis we have made the following series of experiments:

Personally, we do not believe in the actual presence of the sulfocyanid, notwithstanding the chemical test; we think that this constant reaction given by the perchlorid of iron indicates the presence of another body, an organic compound perhaps, not yet found, which gives a chemical reaction analogous to the sulfocyanid, but which is not that salt.

We have employed in our experiments solutions of 0.06 to 1000, 0.10 to 1000, and 0.20 to 1000 of potassium sulfocyanid in distilled water on the one hand, and in physiological serum on the other, but we have not observed any bactericidal action. Here is one of the experiments made with a 0.10 to 1000 solution.

We have taken a platinum point of a staphylococcus culture which has been placed in a small tube containing two cubic centimeters of the above sulfocyanid solution, then we immediately took a point of this solution to contaminate a tube of liquid gelatin, from which a Petri gelatin plate was made. The liquid was then placed in the oven at 37° C. Half an hour later another culture was made, as well as one hour after, and twenty-four hours later. The same experiment was made with the bacillus of typhoid fever.

I.

Immediately.	½ hour.	1 hour.	24 hours.
Staphylococcus.			
600	420	462	1400
Typhoid fever bacillus.			
364	195	212	203

These experiments repeated with 0.06 per 1000 and 0.20 per 1000 gave the same negative results. The action of the potassium sulfocyanid in the saliva as a salivary antiseptic is most contestable, and plays no bactericidal part.

Action of Phagocytosis in the phenomenon of protection of the buccal mucous membrane against the invasion of bacteria.—If the bactericidal properties of the saliva remain very problematical, it is not so with the part played by phagocytosis in the protection of the organism in general and the oral cavity in particular.

We know in a general way that Metschnikoff attributes a phagocytic property to the mesodermic cells, and, in particular, to certain varieties of leucocytes. If the lymphocytes, small embryonal leucocytes, with a large nucleus and little protoplasm, are not phagocytic, the other two principal varieties of blood leucocytes, the mononuclear leucocytes (large leucocytes with abundance of non-granulated protoplasm, one single rounded or oval nucleus, vesicular, fixing slightly the basic coloring matter), and especially the polynuclear leucocytes (leucocytes with multiple nuclei, fixing strongly the basic coloring mater with a protoplasm sprinkled with neutrophile granulations), are endowed to the highest degree with phagocytic properties. These two varieties of cells possess amœboid properties, and it is especially the latter, the polynuclear cells, which are essentially migrating cells, which in the pathological as well as in the physiological state come out of the vessels to pass into the lymphatic circulation and between the membranes of the surface, epithelium and mucous membranes.

The other variety of leucocytes, the eosinophile leucocytes, or those with acid granulations, have much less important phagocytic properties.

The leucocytes are not the only phagocytic cells; we know the part attributed by Metschnikoff and well demonstrated for the experimental carbuncle infection by Werigo to the endothelial cells of the viscera, to the endothelial cells of the lung, and, above all, to the endothelial cells of liver and spleen capillaries.

As to the fixed cells of the connective tissue and the cells with basic granulations, their phagocytic part is questionable.

The epithelial cells which cover the cutaneous or mucous surfaces do not possess phagocytic properties, and the microbes which are often stuck on their surface can penetrate into them, but are not englobed by them as by the leucocytes.

The different varieties of contractile and phagocytic leucocytes, the polynuclear leucocytes especially, are found in great quantity in the derm situated under the mucous membrane; in the mouth, in particular, their number is particularly important, and there almost exists, so to say, behind the epithelial membrane, a real lymphatic lake. It is especially on a level with the posterior pharynx that this lymphatic formation is of considerable importance, besides the two tonsils, which are nothing else than two lymphatic centers in intimate connection with the buccal mucous membrane, and which, by its lacunæ and crypts, still more multiplies the relations between the bucco-pharyngeal cavity and the lymphatic organs. There exists in the whole cavity of the posterior pharynx an uninterrupted layer of lymphatic follicles, some isolated and irregularly disseminated, occupying the posterior pharygeal wall; the others from vertical lines, doubling on each side the posterior pillar of the soft palate; the others are spread on the dorsal surface of the tongue, constituting a sort of layer extending between the lingual V and the circumvallate papillæ, the epiglottis and the tonsils. Let us mention, in addition, the follicular masses known as the palatal tonsils or Luschka's pharyngeal tonsil.

Numerous leucocytes coming from these lymphatic centers constantly arrive at the surface of the mucous membrane, which phenomenon has been well demonstrated by Stoer. This exit is demonstrated by the presence in the secretions and by a microscopical examination of the mucous membrane, where one can see the passage of the migrating cells between the epithelial cells.

EXPERIMENTS CONCERNING THE POSITIVE CHEMIOTACTILE PROPERTIES OF THE NON-FILTERED HUMAN SALIVA.

The attractive and repulsive action of certain agents was first studied on vegetables of simple organization by Pfieffer, and has been extended to the leucocytes especially by Massart and Bordet, who have clearly demonstrated the chemiotactile properties of the white blood-corpuscles. By introducing into the peritoneal cavity of an animal small capillary tubes containing the substance, the influence of which is to be determined, these authors observed that in case of positive chemiotaxy the leucocytes penetrated in great quantity in these tubes. It was found that a great number of microbes possessed these positive chemiotactile properties.

The saliva being a medium of culture where a considerable number of microbes are found, one can think that these organisms secrete certain substances capable of having a positive chemiotactile property on the leucocytes, and the fact is probable on account of the saprophytic state in which these microbes of the mouth are found, so that the toxins and leucocytes become accustomed one toward the other. Massart has already shown how by a sort of preliminary education a living cell can be attracted by a substance which previously presented negative chemiotactile properties.

Extending to the mouth these general facts, one can formulate the hypothesis that the saliva in the normal state exerts a continuous attraction for the leucocytes which influences the accumulation of leucocytes or phagocytes, so favoring the protective reaction, and that this action, taking place on the surface of a wound in case of traumatism, permits an abundant reunion of leucocytes, which englobe the bacteria introduced in the wound with the saliva.

To study whether the saliva really possesses attractive properties toward the leucocytes, we have used the same technique employed by Massart and Bordet to determine the chemiotactile properties of the white blood-corpuscles.

This process consists in introducing in small capillary tubes the substance which is supposed to possess or not attractive properties. These tubes are closed at one extremity. So prepared, they are united several together with a thread and placed in the peritoneal cavity of a guinea-pig, where they are left several hours; they are then taken out again, and, if the substance studied presents attractive properties, one can observe that a certain number of leucocytes of peritoneal origin have penetrated in the tube, forming a compact plup, obstructing the lumen of the capillary tube.

The experiment which we have made is the following: Human saliva ejected in the morning is left for some time in an experiment glass. The upper part of the liquid, left a few hours at the ordinary temperature, becomes clearer, is taken and introduced in small quantities in capillary tubes, which are each one closed at one extremity. They are then introduced into the peritoneal cavity of a guinea-pig, where they are left eight hours, after which they are taken out. One finds then that the leucocytes have formed a dense plug two millimeters long. The same experiment repeated on mice gave us the same results.

Moreover, in another series of experiments made with saliva which was kept for twenty-four hours in the oven at 37° C., and in which the number of microbes had greatly increased, we found that the plug formed by the leucocytes in the capillary tubes was visibly larger. The value of the attraction exerted by the leucocytes is then in relation with the intensity of the culture, and consequently with the quantity of microbian products present in the liquid.

But in this experiment I have used a saliva from a species different from the one from which we have studied the white blood-corpuscles from a chemiotactile point of view. This circumstance could be considered as falsifying the result of the experiment. We know that the human saliva attracts in a very positive manner the leucocytes of guinea-pigs and mice. Does the saliva of one animal attract the leucocytes of the same animal?

With a pointed glass tube saliva is obtained from the mouth of a guinea-pig, and is examined microscopically. One observes that the liquid is packed with microbes of all sorts, among which are seen very thin and straight bacilli, which are colored by the Gram stain, a streptococcus, large diplococci which are also colored by the Gram stain, a long and fine bacillus which is not colored by the Gram stain, a cocco-bacillus presenting the same particularity and resembling very much Friedlander's pneumococcus. Capillary tubes are filled with this saliva, and introduced with all due antiseptic precautions in the peritoneal cavity of the animal from which the saliva has been obtained. Ten hours later the tubes are taken out, and one observes that the leucocytes have well penetrated into the capillary tubes.

The leucocytes, which are placed on a microscopic slide and colored, appear under the form of polynuclear cells. These leucocytes are, so far as one could see, the most active phagocytes, and certain of these cells contained in their protoplasm microbes which had been in the saliva.

In all these experiments we have prepared not only capillary tubes containing the saliva to be examined, but also other tubes filled with a substance surely attracting the leucocytes (such as broth contaminated by the staphylococcus aureus), and others containing substances which possess no attractive influence on them, such as an aqueous solution of NaCl (0.60 to 100), which are introduced into the abdominal cavity of guinea-pigs. These tubes are introduced as control experiments.

From what precedes, we can deduce that when a wound is produced in the mouth, artificially or accidentally, the saliva bathing the lesion exerts on the leucocytes an attractive influence, the effects of which are the more marked if this influence is exerted in a constant and prolonged form.

There remains to determine experimentally whether the phagocytes of an animal—a guinea-pig for example—are capable of englobing and digesting the microbes which are cultivated in the salivary secretion. In this point of view, one can easily study the leucocytes of guinea-pigs by taking from that animal a small quantity of peritoneal exudate, of which one has previously increased the number of phagocytes by injecting into the peritoneal cavity, twenty-four hours in advance, some peptonized broth. If one mixes some of that exudate with the saliva, and transferring the drop so obtained in the incubator at 35° C., preventing the evaporation by using the moist chamber, the phagocytes can accomplish their function and englobe the microbes brought into contact with them.

Experiments.—a (Human Saliva.)—Leucocytes from guinea-pigs are mixed with human saliva, which had previously been left quiet for several hours to allow alimentary particles or other cellular elements to deposit at the bottom of the glass. The preparation is then carried to the oven for one hour; the liquid is then placed on slides and fixed, then colored by Ehrlich's process, which consists in the excessive use of eosin and methyl blue.

Eosin is used in hydro-alcoholic solution,

Eosin, B, aqueous kind	0.50.
Alcohol 60°	100 grams.

and the methyl blue in aqueous solution,

Methyl blue	3 grams.
Distilled water	100 grams.

The preparation is brought in contact with each of the coloring matters for four to five minutes. On microscopical examination of the slides, one observes that the leucocytes have taken up the microbes with great avidity also, that among the variable microbian species found in the saliva there is not one which has not some of its representatives amidst the protoplasm of the leucocytes.

b (Guinea-Pig Saliva.)—A small quantity of saliva from this animal is collected and mixed with leucocytes taken from the peritoneal cavity of the same animal. These preparations are placed in the oven, where they are left for two hours, after which they are colored, and one observes that the englobement of the microbes is as complete as possible.

Two facts are therefore proven. The saliva attracts the leucocytes, and favors, consequently, when a wound is produced in the mouth, the rapid arrival of these protective elements. The leucocytes are capable of absorbing with the greatest energy the different microbes present in the oral cavity and of destroying them.

There now remains to observe the activity of such englobement in a wound produced artificially in the mouth.

A trace of saliva is taken from a guinea-pig, from which preparations are made and colored, some with the methyl blue and others with the Gram. This being done, a wound is made on the gum in the median line of the inferior maxilla, part of the mucous membrane is removed, and the wound and bone somewhat scraped. Twenty hours later, one finds that the wound presents a white coating constituted by leucocytes, almost all polynuclear, some mononuclear; these leucocytes are smeared on a microscopic slide and colored.

In the protoplasm of these cells one easily finds the presence of a variety of microbes, similar in their form, character of coloration, to those seen in the preparation of saliva. Quite a considerable number of englobed microbes are less energetically colored than those which remained free in the surrounding liquid; this is a proof of their phagocytic destruction. Some of them, contained in phagocytic protoplasm, absorb eosin instead of being colored by their natural coloring matter, the methyl blue.

These color reactions are of the greatest interest, and must arrest us one moment.

The loss of the coloring power of bacteria is, as was well demonstrated by Metschnikoff, a good indication of their degeneration; it is a well-known fact to-day. It is not the same with the properties which possess the degenerated bacteria of fixing not only the anilin basic colors, as in the normal state, but also the acid colors, eosin in particular, so that the cells which contain acidophile granulations very much resemble real eosinophile leucocytes, and we are justified in asking ourselves whether a great number of eosinophile cells are not phagocytic leucocytes containing in their protoplasm degenerated bacteria.

The saliva in the last experiment contained no streptococcus chains. It is easy to introduce in the mouth a few drops of a virulent culture, and to see if the englobement has taken place. To this end, a few drops of streptococci culture were introduced in the guinea-pig's mouth, where a wound existed.

Four hours later, the surface of the wound was gently scraped and an exudate rich in leucocytes collected; in some of these cells streptococcic chains, analogous to the ones found in the culture, were easily observable. The next day the wound was cicatrizing and closed without any further accident. The same facts of phagocytosis and destruction of the microbes existing in the mouth by the leucocytes are observed, if we introduce in the gum of the animal a foreign body, a splinter of wood, for example. Soon, around the foreign body, pus appears, which is constituted of leucocytes, several of them containing bacteria, cocci, derived from the saliva. In the leucocytes the microbes are much less colorable, as they are partially degenerated; out of the leucocytes they keep their normal aspect.

We are then justified in concluding that the resistance of the tissues constituting the buccal parietes toward the microbian agents, so abundant in the mouth, is due to the energy of phagocytosis, a general function of the organism.

On the chemiotactile property of the filtered saliva.—In the preceding experiments, we have employed the saliva as we found it, in the buccal cavity, mixed with microbes and not filtered; it is this saliva which is most interesting to us in a clinical point of view, as the filtered saliva is never present. Still it was open to the objection that this positive chemiotactile property was not due to the salivary liquid itself, but to the presence of bacteria in this liquid, and, in fact, this is what results from the following experiment:

Human saliva was collected in the morning in sterilized tubes. One hour later, this saliva was filtered with the Chamberland filter. He then took a series of six capillary tubes, in which was introduced filtered saliva. These tubes were closed at one extremity. Another series of six tubes containing physiological serum was made, and finally six tubes containing a cholera culture. These three bunches, separately attached, were placed in the peritoneal cavity of a guinea-pig and left ten hours. When removed, we observed that the tubes containing the cholera culture presented a dense plug of leucocytes, while in those containing the saliva only a very small number of leucocytes had penetrated, and so very few that it may be considered as neutral. In the tubes containing the physiological serum no trace of phagocytes existed.

Part played by the epithelial cells and the vital antagonism of microbes.—The phagocytic action is not the only one of the numerous causes of destruction of bacteria; an additional mode of protection of the buccal cavity in general and gums in particular against the invasion of the pathogenic microbes is that general property possessed by stratified pavement epithelia to renew themselves continuously by their superficial layers. In the same way as on the skin, where the epithelial cells are in a state of permanent desquamation, in the bucco-pharyngeal cavity the epithelial cells are also constantly replaced. This desquamation is especially active during the act of mastication; enormous quantities of cells are rejected, and one can say that at each meal the complete epithelial covering of the buccal cavity is renewed. If the epithelial cells do not possess phagocytic properties, they are lined on their surface, filled between them, sometimes even penetrated by scattered bacteria, which are dislodged and swept away by the saliva into the alimentary canal, where the stomach destroys them.

One could, as already indicated by Mendel Joseph, now that our knowledge on the reciprocal action of microbes has become more complete, explain that the attenuation of the virulence of a microbe which exists in very restricted quantity in the mouth may be due not to the saliva itself, but to the micro-organisms of all kinds which are present in that liquid. It is a fact that certain microbian species, special to the mouth, grow more vigorously than others in the saliva, and that their development can prevent the development of other frail microbes or diminish their vitality, and render their pathogenic faculties less active. The microbes interfere with one another, and this interference must bear especially on species which are not well adapted to the nutritive media where they are found.

The pneumococcus, for example, can be found in the saliva, but its development is never so luxurious as that of the bacteria which have for their ordinary medium of culture the saliva, and which have been for a long time adapted to that medium.

The ordinary saprophytes of the saliva are, then, those which in the antagonism between the species have the greatest chance of remaining victorious by restraining the development of the other microbes which are accidentally met with in the mouth. Metschnikoff has even demonstrated that there exist certain preventive microbes—that is, microbes the presence of which is particularly disagreeable to certain other microbian species.

This vital antagonism we observe everywhere as one of the principal agents of destruction of bacteria accidentally introduced into a certain medium. It is this fact which explains why certain pathogenic microbes, such as the bacillus of typhoid fever, the carbuncle bacillus, introduced in water, disappear rapidly, and which permits us to comprehend the spontaneous cleaning of the waters of rivers.

One can conclude that the resistance of the tissues constituting the buccal parietes, by the microbian agents so numerous in the buccal cavity, is due to the energy of the phagocytosis as a general function, but favored here especially by the constancy of the attraction exerted on the leucocytes by the microbes and their products dissolved in the saliva. One must not forget, however, the attenuation of the virulence of bacteria by the mucus and transuded serum, the destruction of a great number of bacteria by the constant desquamation, and the diminution of the number of species by the vital antagonism.

THE PHYSICAL PROPERTIES OF THE SILVER-TIN AMALGAMS.

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Dental Cosmos.

This series of studies was undertaken to determine the precise effects of aging upon dental alloys. To that end freshly-cut alloys of known formula, alloys made for the purpose by some of our best manufacturers, were put aside, protected in various ways, and exposed in various ways, in order to test the effects of time under the various conditions. The end and aim of this work was to find the means of keeping cut alloys in good condition for use, for it was certain that by the mode of handling in vogue there could be no certainty that an alloy sent out in good condition by the manufacturer would reach his customer in suitable condition for filling teeth.

Alloys were put up in corked bottles; in long tubes partly filled, corked with cotton and inverted, so that with every change of temperature the air would be drawn in and forced out through the cut alloy. This was to obtain the full effect of contact with the air without contamination with dust. Alloys were put up in glass tubes packed full and hermetically sealed. Some of these were protected from light by wrapping in tin-foil; some were exposed freely to the light; and some were kept in an ordinary drawer without especial precautions. Some were hermetically sealed in large tubes that were damp and but partly filled with alloy, so that it should be constantly in contact with moisture.

In the selection of formulæ for this work I chose silver 65, tin 35, as the one with which all experiments were to be made; but several other formulæ were put up for purposes of comparison. This selection was made for the reason that among the alloys I had used, this, when fresh-cut, was closest to what was wanted in shrinkage and expansion.

The first tests were made of the alloys in the hermetically sealed tubes. These were broken one by one, and test fillings immediately made. Those put up in October gave a shrinkage of five points. Those put up in the first week in January gave a shrinkage of two points. Those that were put up damp gave the same results as those put up dry. Those fully exposed to the light gave the same results as those excluded from the light. Turning now to those put up in corked bottles, I again found the results the same as from the alloys put up in the sealed tubes. Those put up in October gave five points shrinkage, while those put up in January gave two points shrinkage. Those put up in inverted tubes so as to be exposed to frequent changes of air showed no difference from those that were put up in corked bottles, or hermetically sealed tubes. Tubes put up in November and December gave immediate results.

Interspersed with these tests, fresh cuttings were made from portions of the ingots from which the alloys had come, and these uniformly gave the same results as in the previous tests, an expansion of one and two points. Alloys laid away in the ingot seem to suffer no change.

It was found that filings which were accidentally placed in situations where they were subjected to differences of temperature due to changes of season had their physical properties undergo a marked change. Following upon an examination of the effects of oxidation, it is necessary, therefore to investigate the influence of temperature upon alloys.

The artificial aging was done by placing the hermetically sealed tubes in boiling water for ten minutes. The alloy used was silver 65, tin 35, which, fresh-cut, gave an expansion of one point. Tests of each ingot fresh-cut were never neglected. The result from the agings was substantially nine points in each case; the hydrogen tubes, the nitrogen tubes, and the oxygen tubes giving like results. This was repeated again and again, but there was no difference in results.

The sealed tubes, with the alloy in each of the three gases named, when tested two months later, together with the same alloy put up in a corked bottle as a control, each gave like results. It is therefore shown that the change in the alloy is not dependent on the presence of absence of oxygen. Oxidation has nothing to do with it. It is not a chemical agent acting upon the alloy from without.

While these tests were in progress I had also put up alloys in fluids that contain no oxygen, choosing for the purpose highly evaporable substances that would be removed by evaporation while mixing the alloy with mercury, as the chloroform, rhigolene, and gasoline. In these fluids the aging by time at ordinary temperatures seemed to go slower than in air, and in the cooler spring months looked as though it might be of value. But when the warmer days came they went as the rest. Progressively the shrinkage became greater until it was demonstrated that the scheme was of no value.

All of the evidence now seemed to point to temperature as the one factor producing these changes in cut alloys. All formulæ tried had been affected in a similar manner, but in varying degree.

Specimens of alloys were sealed in tubes. Some of these were placed in a refrigerating apparatus. Others maintained at a constant temperature of about 130° F. in incubating ovens; others were hung in a south window.

First, as to the alloys hung in the south window. This was begun early in April, when we had some days that for the season were quite warm. The first effect noted was a marked change in the working property. An alloy containing as much as sixty-five per cent. of silver, when fresh cut, works harshly and sets very quickly; so quickly that one must be very expeditious to make anything more than an ordinary filling before the mass it too hard. This harshness and quickness of setting was notably modified in two days, so that the alloy could be worked with more ease and leisure. Within a week, however, the fillings came to shrink and the margins to show shrinkage gaps on microscopic examination. In three weeks they came to shrink seven to eight points. The tubes, wrapped in tin-foil to exclude the light, were placed side by side with those fully exposed to the light. The result was the same in both sets of tubes. The exposure of light seemed of no consequence.

In this experiment we had a variable temperature, high during the middle of the day and remitting to a comparatively low temperature at night. A thermometer was hung with the tubes of alloy. The highest temperature noted was 105° F., but it rarely exceeded 95°. Alloys of other formulæ hung with the silver 65, tin 35, shrunk in different degree, but all were markedly changed. If they were found to shrink fresh-cut they came to shrink more. If they were found to expand fresh-cut they came to expand less, or finally to shrink.

The ovens for maintaining an even temperature were set at 140°, 130°, and at 120° F. At the temperature of 140° cut alloys came to shrink very quickly, the full limit of shrinkage occurring in from six to twelve hours. At 130° the effect was a little slower, but at this temperature I obtained a little greater shrinkage with the formula silver 65, tin 35, than with any other; instead of nine points, ten, and in one case eleven was obtained. With 120° the effect was still slower, and seemed to stop at nine points shrinkage, or about the same point as that obtained in boiling water. The full effect seemed to be produced in about three and a half days; at least no further effect was noticeable after a continuance of seven to ten days longer; 110° was also found to affect the alloys promptly.

In all of these experiments in aging in the incubating ovens (low-temperature aging), the most salutary effect on the working property of the alloys was noticeable, the lowest temperatures producing the best results. The agings at 110° and the agings in the sun produced the best working property. The difference between these and those aged in boiling water was very pronounced, and in favor of the low-temperature aging. With any of the plans, however, the working property is greatly improved. The fact that I failed to obtain as much shrinkage with other temperatures as with 130° has caused me to use that temperature in all cases where I have tested alloys for their full limit of shrinkage.

The alloys placed in the cold brine at the ice factory were examined after three weeks. The alloy, hermetically sealed in glass, had laid undisturbed during that time. The temperature record gave 17° F. as the highest, and 13° as the lowest, that had occurred during that time. The first test filling was mixed with mercury within fifteen minutes after the alloy was removed from the brine; another in one and a half hours, and a third in three hours. The alloy worked as crisp and harsh as the fresh-cut, and seemed to harden just as quickly. Two of the fillings gave one point expansion and one two points. Three weeks' more time gave like results; that is to say, no change in the alloy became perceptible at a temperature of 17° and lower.

The alloys kept on ice were examined at frequent intervals. During the first ten days no change seemed to occur, the alloy remaining as crisp seemingly as when fresh cut, and continuing to give the usual expansion. I then cut a supply for use in my practice and placed it on the ice, and afterward was handling it frequently; besides making occasional test fillings from that first placed on the ice. After about fifteen days a marked change in the working property began to be manifest; and gradually the alloy came to work much softer and did not set so quickly. But notwithstanding the change in the working property, it did not shrink. I had so long regarded the change in the working property as a part of the change of condition which induces shrinkage, that it was very difficult for me to regard the one as separate from the other. But they are evidently in some degree separate factors. This softening of the working property continued to increase, and at the end of three months I found that the test fillings did not stand up as sharply as at first. My supply of the material first put up was running low so that I could not make fillings so often, and it was not examined again until the end of five months. At that time I found a shrinkage of two points, the results being the same in two separate tests. The sample of the same cutting sifted together with that placed on the ice, and then divided from it and placed in a corked bottle in my drawer, where it had remained from May to September, was now tested in two separate fillings, both of which gave a shrinkage of eight points.

This is sufficient detail, perhaps, to give the reader a fair idea of the effects of temperature on cut alloys. It must be remembered that in the last test given the alloy had been in my drawer from May until the last of September, and had passed through the heated term of July and August. Alloys that had been two and a half months in a cold room in winter shrunk two points. Alloys that had been in a moderately warmed room from the middle of October to the first week in January, and in a cold room until the middle of March, shrunk five points. Alloys that were kept in a room that was warmed, and very close to the heater so that many times they were very warm, from the first week in January till the latter part of March shrunk eight and nine points. These were silver 65, tin 35, and tests fresh cut gave an expansion of one or two points. All of my observations tend to confirm these results. Indeed, there has been no other kind of results from time and differences of temperature. The effects of artificial temperatures are not out of harmony with these results. It is little wonder that amalgam has been an uncertain filling material.

In his work on plastics and plastic fillings, Dr. Flagg states that alloys may be aged by shaking in a bottle. I tried this last fall, and a definite change resulted. If they should be so placed in a car that shaking will occur, the physical properties will be changed. Since I had found that aging occurred from comparatively low temperatures, the question of the effect of the warmth of the hand had to be considered. I sealed several tubes in glass, and went to Kellogg Bros. machine shop, selected a shaft that was revolving about seventy times per minute, and secured two of the tubes to its end in such a way that they would be turned end over end with every revolution. A third tube was left in such position as to be exposed to the same thermal influences without being shaken, to serve as a control. The shaking was continued twenty hours. Test fillings were made immediately afterward, and the three tubes gave like results. No aging had occurred from the shaking.

In this way I have tried one thing after another, until I have excluded everything that has been suggested to my mind as possibly affecting the physical characters of cut alloys, and gradually it has been narrowed down to the one factor, thermal influences.

The material for each filling is weighed as closely as one twentieth of a grain, and with the formula, silver 65, tin 35, the proportions are fifty per cent. of alloy to fifty per cent. of mercury. This is partially amalgamated by stirring (not grinding) in a mortar until all of the cuttings are engaged with the mercury. This is to prevent the loss of material that will occur if this part of the mixing is done in the hand. All of the work is done over a sheet of clean white paper, so that loss may be prevented. Now the mix is turned into the hand and kneaded to softness. In every case, no matter what the alloy, this mass must be soft enough to readily take good impressions of the skin markings of the fingers without being sloppy to knead. A mass that is sloppy soft cannot be properly kneaded. When a strange formula is taken up, the proportion of mercury that will do this is to be found by experiment before fillings are made, or if from any cause such a mix is not obtained, the mass is thrown aside and a new one made.

The kneaded mass is now weighed to see if any, or how much, loss has occurred in the mixing, and the record made. It is particularly noted as to whether there is any, or how much, stiffening of the mass during the time of the weighing, as indicating the quickness or slowness of the setting. These records being made in brief, the mass is again turned into the hand and kneaded, in case a little stiffening has occurred, into condition for wringing out the excess of mercury. It is then wrapped in strong muslin, so that a good hand-hold can be had to either end, and twisted with about all the strength of the hands. The mass usually made for these test fillings weighs one hundred and forty grains when blocks for trial of flow and crushing stress are to be made, or one hundred and twenty to one hundred and thirty grains when only the tube filling is to be made; and it requires about three times the power to produce the same dryness in a mass of this size as the usual mass made for filling teeth. Now the mass, as wrung out, is again weighed to determine the amount of mercury lost. After this record is made, the packing of the filling is proceeded with, using a very broad serrated point for the main portion of the work, but going around the margins with a smaller instrument, being careful to use only such force as will compress, and not cut into, the material. If in packing, the surface of the material becomes soft or muddy, it is dried out by heavy pressure with a large rubber point that, when strongly pressed upon, just fills the diameter of the cavity. The cavity is filled more than full, and dressed down level, and then a steel disk one hundredth of an inch thick is pressed into the surface in the center of the filling, as a contact point for the micrometer in taking measurements. Amalgam is again packed on the surface of the filling, and it is again dressed down level and finished as perfectly as possible, so that its margin may be in the best practicable condition for microscopic examination. The filling is not touched afterwards. The first measurement is made immediately it is completed, and when it is possible the filling is examined with the micrometer every hour for the first five or six hours, and twice per day afterward until all movement has ceased. It is also examined with the microscope almost as frequently, to see if the visible movement is in agreement with the micrometer record. Whenever there is a failure in this correspondence—and they occur occasionally—there is something wrong, some error that is to be found and righted. Thus the two instruments are a continual check on each other.

When the filling is completed and the first measurement is taken, the notes of the case are put into permanent form, and the calculations made which show the percentage of mercury in the mass at every step in its preparation, and the percentage remaining in the fillings. All of these figures (the calculations) are preserved, so that they may be reviewed for error at any time. The working property, rapidity or slowness of setting, and other peculiarities of each mass are described. Nothing is left to memory.

To the end of discovering differences occurring in alloys, and differences in formulæ, each filling is made as nearly like every other filling as practicable, considering the differences in physical characters. Those alloys now to be studied that have a larger proportion of silver dissolve much less readily in mercury, and require to be kneaded much harder and longer, or even to be ground in the mortar to obtain the best strength of the amalgam, and the best working property of the mass. They give up their excess of mercury more readily, and should not be wrung with as much force. But otherwise the effort has been to treat all as nearly alike as possible.

The micro-organisms that are instrumental in causing caries of the teeth measure from 0.4 to 0.8 micromillimeter. Now, one-ten-thousandth inch is substantially 2.5 micromillimeters. From this it will be seen that if shrinkage opens the margins of a cavity that has been filled with amalgam one-ten-thousandth of an inch, or even one-half that, there is room for the free entrance of micro-organisms.

The reader will have noticed that with the alloy, silver 65, tin 35, the shrinkage produced by subjecting it to the temperature of boiling water has been nine points quite uniformly. That shrinkage was exceeded only by subjecting the alloy to the temperature of 130° continuously for a number of days, and after that degree of shrinkage was produced a longer continuance of that temperature seemed to produce no further effect. Substantially the same result has been produced with each alloy that has been subjected to trial, only that there has been a difference in the amount of shrinkage produced. In other words, each alloy is found to have a fairly definite shrinkage expansion range. In some this range is all shrinkage, in others it is all expansion, and in still others it is both expansion and shrinkage. Unmodified silver-tin alloys (those that contain no other metal) that have seventy-five per cent. of silver or more expand only. They cannot be made to shrink by aging though their expansion can be greatly modified. The unmodified alloys containing as much as sixty-five per cent. of silver, and less than seventy-five per cent., expand when fresh cut and shrink when fully aged. Those alloys containing as much as fifty per cent. of silver, and up to sixty-one or-two per cent., shrink only, but shrink much more when aged than when used fresh cut. Those that contain less than fifty per cent. of silver first shrink and then expand. When used fresh cut the expansion is the greater; when aged the shrinkage is the greater. Alloys containing from sixty-five to seventy-five per cent. of silver are hard, and make hard and quick setting amalgams; they make also the strongest amalgams that can be made of silver and tin. Alloys containing less than sixty per cent. of silver are soft, and make soft, slow-setting amalgams. These grade into the group above somewhat gradually. Alloys containing more than seventy-five per cent. of silver are soft, and make frail, slow-setting amalgams. The slow setting occurs somewhat suddenly after passing seventy-five per cent.

While these subdivisions of the silver-tin alloys grade into each other more or less gradually, they are sufficiently distinct to be of much value in the study of the possibilities of the silver-tin amalgams. That group between sixty-five and seventy-five per cent. of silver must be our dependence in the consideration of the unmodified alloys for filling teeth. All of them are readily brought to the point of either shrinkage or expansion by fractional aging, or fractional annealing and tempering. For instance, the alloy, silver 70, tin 30, expands fourteen points when used fresh cut, and shrinks seven points when fully annealed. It only requires a few experiments with annealing this alloy in the incubating ovens to be able to stop off the annealing when the zero line is reached; and this is true of any alloy of this group. Experiment has shown that formula will come to shrink more by time at common temperatures.

The explanation which I suggest is briefly this: In the cutting of an alloy the violence used hardens it, producing an allotropic condition of the metal, in which its chemical relations to mercury are profoundly changed. High temperatures, or even ordinary temperatures acting for a considerable time, have the effect of annealing the cut alloy and restoring its normal condition.

If this explanation holds good, an alloy that has been fully aged or annealed, that is, brought to its normal condition, should remain in that condition indefinitely at normal temperatures. I began experimentation on this theory in the latter part of April last. The first experiment was to harden a portion of an ingot as much as possible by hammering, and to compare the results from cuttings from this with cuttings from the contiguous portion of the ingot not hammered. The tests showed an increase in expansion of four points. The next thing to do was to find an alloy that would neither shrink nor expand when fully annealed, also to learn what constitutes full annealing. I had a number of formulæ cast and began the work of annealing them to the zero line, trying at first to do this by the boiling water method and later abandoning the boiling water in favor of the ovens. Experiment showed that the range of formulæ of the unmodified silver-tin alloys would have to be limited to that lying between 70 of silver to 30 of tin, and 75 of silver to 25 of tin. The former annealed to zero would come to shrink more in summer temperature. The latter could not be held down to the zero line.

The experiments with silver 75, tin 25, seem to illustrate a principle. When the alloy is used fresh-cut it gives about sixty points expansion; varying considerably in different fillings, as is always the case with great movements, whether up or down. In the upward movement the filling rises squarely up above the margins of the cavity without spheroiding, if the cavity-walls are parallel and very smooth. If the cavity-walls are rough or uneven, it will spheroid (round up in the center) or take various shapes, as it is held down more or less by various portions of the cavity-walls, and the measurement will vary accordingly. When the condition of the alloy is such that the movement is very slight, the results are very constant. I first annealed this alloy (silver 75, tin 25) ten minutes in boiling water.* This was insufficient, and fifteen was tried, by which the expansion was reduced to six points. Increasing the time to thirty minutes, and finally to one hour, produced no further change. I then placed fresh cuttings in glycerol heated to 300° F. for half an hour. This reduced the expansion to one and one and a half points in the several fillings made. The alloy thus annealed was put in corked bottles, and some placed in my drawer and some in the south window in the sun. In the course of a month all of these specimens came to expand five and six points. This seemed to demonstrate that an alloy could be over-annealed, so that in normal temperature it would gravitate back to a condition of expansion. Here a danger was pointed out to be avoided in the annealing and tempering of alloys.

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*All of these annealings are done by placing the cut alloy in a small flask blown on the end of a glass tube a foot or more long, and immersing the flask in boiling water.

An alloy of silver 72.5, tin 27.5 was next tried. The limit of its expansion fresh-cut was about forty points. By annealing fifteen minutes in boiling water, or for twenty-four hours at 130° F., it was caused to shrink two points.

So far as I am now able to see, the greatest difficulty will be to cast the ingots with sufficient uniformity to satisfy the demands of rigorous tests. It is not always that the formula weighed into the crucible is represented in the ingot. Perhaps it never is perfect, and certainly more of the tin is lost in some cases than in others. I have found that as I have adopted more perfect means of preventing the oxidation of tin in melting and casting, I have had to put a larger proportion of silver in the crucible. Alloys within and near this range are exceedingly sensitive, so sensitive that every fraction of a part lost or gained counts in the results.

When I began to realize that there were variations in ingots of the same formula that influenced my results, I supposed that the specific gravity would serve as an index to the loss of tin in melting and casting. I found the ingot heavier than the mean of the metals composing it; or, at least, heavier than the mean of the metals weighed into the crucible. This result would occur from the loss of tin by oxidation. I took the specific gravity of most of the ingots I used in my work. The ingots of silver 65, tin 35, gave an average specific gravity of about 9.5, while the mean specific gravity of the metals that went into the crucible was but 9.11. The variation found in the ingots when the whole ingot was weighed ran from 9.48 to 9.53. Now, the mean specific gravity of silver 76, tin 24, is 9.51, and my specific gravity tests indicated that the true formula of the ingots of the supposed silver 65, tin 35, was very near that figure, but with a variation of about 5 per cent. in their composition. This increase in the specific gravity was much more in the alloys containing a high percentage than in those containing a low percentage of silver.

When I came to casting myself, and keeping close records of the loss of weight in my melts, I found that the loss of weight was not in agreement with the change in specific gravity, and that this test indicated a marked condensation of the metals in the formation of the alloy. These tests are not altogether satisfactory, and yet they indicate the condensation very certainly. The series of formulæ made, included formula of silver 40, tin 60; silver 75, tin 25; and the intermediate formula by steps of five per cent., and by steps of one per cent. between seventy-two and seventy-five per cent. of silver. These casts showed a nearly regular increase in condensation from below upward to sixty-five per cent. of silver, the apparent condensation remaining about the same above that point.

It is also probable that the perfection of the mixing of the metals will influence the condensation in some degree, especially as it has been found that mixtures of silver and tin do not give the same results as alloys of silver and tin. Also, some part of the differences between ingots of the same formula may be due to air-spaces in the casting. This question can probably be studied more accurately by analysis than by synthesis.

While the specific gravity is not a safe guide to changes of formulæ from the loss of tin in melting and casting, it does seem to be a fairly safe guide to what the ingot will do in test fillings. Of the same formula, the ingots with the higher specific gravity will show less shrinkage when annealed.

The trials of flow and the trials of strength by crushing were with blocks 85x85x85 thousandths of an inch. All of the blocks were made in the same cavity. Six blocks were used in each trial, and the figures represent the average result, the trial being made when the blocks were five days old. The trial of flow was with sixty pounds for one hour, and the figures show the average per cent. of shortening in that time. In crushing the stress was increased continuously until the blocks crushed, and the figures represent the stress at the moment of crushing.*

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* The flow of amalgams was fully described in the Cosmos for July, 1895.

EXHIBIT OF UNMODIFIED SILVER-TIN ALLOYS.

FORMULÆ.		How Prepared.	Per Cent. of Mercury.	Shrinkage.	Expansion.	Flow.	Crushing Stress.
Silver.	Tin.						
40	60	Fresh-Cut.	45.78	6	7	40 15	178
40	60	Annealed.	34.14	9	3	44.60	186
45	55	Fresh-Cut.	49.52	4	8	25.46	188
45	55	Annealed.	32.13	11	1	28.57	222
50	50	Fresh-Cut.	51.18	2	2	22.16	232
50	50	Annealed.	37.58	17	1	21.03	245
55	45	Fresh-Cut.	51.62	2	2	19.66	245
55	45	Annealed.	40.11	18	0	17.53	276
60	40	Fresh-Cut.	52.00	1	0	9.06	239
60	40	Annealed.	39.80	17	0	14.10	297
65	35	Fresh-Cut.	52.00	0	1	3.67	290
65	35	Annealed.	33.00	10	0	5.00	335
70	30	Fresh-Cut.	55.00	0	14	3.45	316
70	30	Annealed.	40.00	7	0	4.67	375
72.5	27.5	Fresh-Cut.	55 00	0	42	3.92	275
72.5	27.5	Annealed.	45.00	3	0	3.76	362
75	25	Fresh-Cut.	55.00	0	60	5.64	258
75	25	Annealed.	50.00	0	6	5.40	300

In the study of this exhibit the differences that occur in the amount of mercury in the fillings from the fresh-cut alloy, and from the annealed, should be particularly noted. It will be seen that it is always less in the fillings made from annealed alloy. This represents in some degree the differences in the solubility of the fresh-cut alloy and the annealed, but not fully, for in making fillings from the fresh-cut alloy the mass is always drier than the mass made from the annealed alloy, notwithstanding the greater proportion of mercury.

In studying the shrinkage and expansion, it will be noted that both shrinkage and expansion are marked for the alloys containing from forty to fifty-five per cent. of silver. In these the shrinkage occurs as the first movement, and the expansion follows later. For instance, in the alloy containing forty per cent. of silver, when used fresh-cut, a shrinkage of six points, occurs within the first twenty-four hours; then it will remain about stationary for from twelve to twenty-four hours more, the margins standing wide open when viewed with a half-inch lens. Then an expansion begins which continues very slowly for three or four days. This expansion is usually a little greater than the shrinkage in alloys containing but forty per cent. of silver; and it generally doubles the shrinkage in alloys containing forty-five per cent. of silver. This dual movement then diminishes with the increase of the silver, and is seldom seen after passing sixty per cent. After this upward movement there is usually a slight shrinkage. Annealing the cut alloy, or aging by time, causes the shrinkage to be greater and reduces the expansion following it. The effect of annealing is much less on the alloy containing but forty per cent. of silver than on any other formula given, and increases as the proportion of silver is increased, until seventy-five per cent. is past, when it again diminishes. The greatest shrinkage occurs with the proportion of fifty-five per cent. of silver to forty-five of tin, a shrinkage of eighteen points. If the walls of the tube are parallel and smooth, the fillings will all fall out of the cavity.

These great shrinkages, such as we get with the formulæ containing from fifty to sixty per cent. of silver, can be much modified by the proportion of mercury in the mix, and the time at which the mass is packed in relation to the time of mixing. These shrinkages occur quickly, often one half occurring within the first two hours after the filling is made. If the packing of the mass is delayed as much as possible, and the filling made dead hard, the shrinkage will be less. If so little mercury is mixed with the mass that it will only make a dark powder that can be made to cohere by strong pressure, the shrinkage will not be quite so great. Still again, if so much mercury is mixed with the alloy as to make a very sloppy mass, and this is put in without removing any of it, the shrinkage will be considerably reduced. None of these prevent shrinkage; they only modify the amount. The two latter methods make very frail amalgams, and none of them are suitable for use in filling teeth. With an alloy in condition to neither shrink nor expand, these influences seem to be inoperative, all of them, so far as I have been able to see thus far, a fact for which we may be very thankful. It seems, from experiments this summer, that if the alloy is in condition to form a compound that neither shrinks nor expands in setting, no manipulation to which I have been able to subject it will cause it to vary from it. I am therefore able to make filling after filling that will measure alike (or within what I regard as the range of error in measurement, about one point), and show no break of the margins on microscopic examination. At the same time the flow and crushing stress may be greatly modified by changes in the amount of mercury and the mode of manipulation.

It will be seen from the exhibit that the alloys containing from fifty to sixty per cent. of silver, used fresh-cut, do not shrink much, and when used in this condition they make fair fillings. When I say fresh-cut, I mean that the alloy is used within one hour after cutting, not a week or a month. We cannot tell what we may have the next day or the next week, unless we know very accurately the thermal conditions to which it has been exposed. In any event we will not have the same thing as the fresh-cut alloy.

When we pass on to sixty-five parts of silver we begin to have expansions of the fresh-cut alloy, and at the same time pass into the group of hard alloys. From this on to the proportion of seventy-five parts of silver the increase in expansion is very rapid, and the alloys are correspondingly sensitive to slight changes in the exact formula. By the steps of five, and two and a half per cent. exhibited, we get one point expansion at sixty-five per cent. of silver, and successively fourteen at seventy, forty-two at seventy-two and a half, and sixty points at seventy-five per cent. of silver. The shrinkage when annealed is reduced less rapidly, and, therefore, the expansion shrinkage range is continually increased. Beginning with the annealed alloy with sixty-five parts of silver we have, according to the new tubes, ten points shrinkage, and successively seven with seventy per cent., three with seventy-two and a half, and then pass to six points expansion in the annealed alloy with seventy-five per cent. of silver. As the formulæ for ingots for the production of tempered alloys by the process of fractional annealing must give a shrinkage of not more than three points, and possibly only two would be admitted, and must not expand when fully annealed, the reader may realize how close is the margin, and how accurate the work must be if their manufacture is really successful. We may have other alloys, as we shall see later, but the exactness required will be none the less.

I will now consider the flow and the strength of amalgams under stress.

Beginning with silver 40, tin 60 parts, the flow is 40 per cent.

for the fresh-cut, and nearly 45 per cent. for the annealed alloy. Taking the individual blocks, the variations were from 33 per cent. to 54. It will be noted that the flow of the annealed alloy is the greater, and also that the crushing stress is the greater. The annealed alloy makes the softer and tougher amalgam. This is the general rule throughout the series, though the difference fades almost entirely away with the larger proportions of silver. Inversions of this rule frequently occur in experimental work in which the blocks from the annealed alloy give the lesser flow. As the resistance to flow is sharply influenced by the proportion of mercury, either too much or too little weakening it, also by the degree of perfection of manipulation, this could hardly be otherwise. An amalgam that will give 40 per cent. flow in one hour under a stress of 60 pounds is not suitable for filling teeth in any position in which the stress of mastication comes upon it. No matter how well it may be seated in the cavity, and even if it did not shrink or expand, it could only be a question of time, and not a long time either, when it would be moved by the stress of mastication, and begin to leak; unless indeed the powers of mastication is much below par. In resistance to crushing, this alloy is also the weakest of the series.

It will be noted that the resistance to flow increases with the increase of silver, and that there is a notable increase in this resistance at 65 per cent.; or when we enter the group of hard alloys. Through this group there is not much variation until 75 per cent. of silver is reached, when the resistance to both flow and crushing begins to decline, and continues slowly to pure silver.

It is somewhat notable that the strongest amalgams may be made from alloys that are but partially annealed. This was first noticed and pointed out to me by Dr. Wedelstaedt, of St. Paul. I have had series of blocks from silver 65, tin 35, the cuttings having been at room temperature for two or three weeks, that gave but 1½ per cent. flow, and resisted crushing up to 400 pounds. Some other formulæ tried have exhibited similar phenomena.

The working properties of this series of alloys differ greatly. In general terms we may say that the group of hard alloys make quick-setting amalgams, and that the soft alloys make slow-setting amalgams. But these grade into each other very gradually as to this property. The quickest-setting is found at about 72½ of silver. With 75 per cent. it is slower, and then the slowness is increased so rapidly that with 80 per cent. of silver the setting is exceedingly slow. With any of the group of hard alloys used fresh-cut, the hardening is so rapid that the operator must have everything in readiness and operate quickly, to make a large filling before the mass is too hard for manipulation.

In my papers last summer I objected to grinding and mixing alloys in the mortar, or so much kneading as many seemed to practice, because the resulting amalgam was made softer. This was correct for all of the softer alloys, but it has been found that for the harder alloys more kneading is required to bring out their best qualities. This is especially the case with those in the neighborhood of 72½ per cent. of silver when annealed to zero.* These hard alloys dissolve very slowly in mercury, are tardy in amalgamating, and much kneading is required to make a fully plastic mass. The kneading will be aided very much by beginning the amalgamation by grinding in a mortar until all the cuttings are engaged with the mercury. Then if the mass is turned into the palm of the hand and kneaded vigorously until it is so plastic that it will readily take good impressions of the skin markings of the fingers without being in any degree sloppy, it will be in good condition when the excess of mercury is wrung out with reasonable pressure. Or it may be used without wringing, only that the amalgam will not be quite so strong. If it becomes sloppy soft it has too much mercury and cannot be properly kneaded. Either a new mass must be made, or a part of the mercury wrung out and the kneading proceeded with. These alloys do not admit of so great a variation of the amount of mercury as the softer alloys. When properly prepared the mass will work reasonably soft, will be sufficiently pasty, and will give plenty of time to make any ordinary filling. It will not, however, admit of much delay.

One of the beauties of the working property of these alloys is, that when the mass is packed it is immediately hard enough so that subsequent manipulation will not spring it away from a wall or margin against which it is packed. It stays where it is packed.

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*I use the term "annealed to zero," when the annealing is stopped at such point that it will neither shrink nor expand.

It is, therefore, possible to make very perfect adaptations to margins; a thing almost impossible with the softer alloys. These soft-working amalgams will spring away from the margins at every touch of an instrument.

THE MODIFIED SILVER-TIN ALLOYS.

Thus far only the simple or unmodified silver-tin alloys have been considered. Alloys to which other metals have been added with the view of modifying their chemical or physical properties, I shall call modified silver-tin alloys.

EXHIBIT OF MODIFIED SILVER-TIN ALLOYS.

FORMULÆ.			How Prepared.	Per Cent. of Mercury.	Shrinkage.	Expansion.	Flow.	Crushing Stress.
Modifying Metal.	Silver.	Tin.						
	65	35	Fresh-Cut.	52.33	0	1	3.67	290
	65	35	Annealed.	33.00	10	0	5.00	335
	66.75	33.25	Fresh-Cut.	51.52	0	4	3.35	329
	66.75	33.25	Annealed.	33.53	7	0	5.06	380
Gold 5.	61.75	33.25	Fresh-Cut.	47.56	0	1	4.62	330
Gold 5.	61.75	33.25	Annealed.	30.35	7	0	6.07	395
Platinum 5.	61.75	33.25	Fresh-Cut.	51.87	0	9	9.68	273
Platinum 5.	61.75	33.25	Annealed.	37.33	7	0	8.20	352
Copper 5.	61.75	33.25	Fresh-Cut.	53.65	0	23	2.38	343
Copper 5.	61.75	33.25	Annealed.	35.60	5	0	3.50	416
Zinc 5.	61.75	33.25	Fresh-Cut.	56.65	0	68	1.83	290
Zinc 5	61.75	33.25	Annealed.	40.65	0	9	2.07	345
Bismuth 5.	61.75	33.25	Fresh-Cut.	46.26	0	0	4.78	288
Bismuth 5.	61.75	33.25	Annealed	23.67	6	0	5.58	308
Cadmium 5.	61.75	33.25	Fresh-Cut.	57.57	0	100	6.40	225
Cadmium 5.	61.75	33.25	Annealed.	47.25	0	5	3.54	290
Lead 5.	61.75	33.25	Fresh-Cut.	44.17	0	1	4.88	290
Lead 5.	61.75	33.25	Annealed.	32.76	10	0	7.18	276
Aluminum 5.	61.75	33.25	Fresh-Cut.	65.00	0	445	...	...
Aluminum 1.	64.5	34.5	Fresh-Cut.	46.98	0	166	12.60	198
Aluminum 1.	64.5	34.5	Annealed.	38.26	0	48	17.90	213

For some years it has been the habit of many manufacturers of alloys to add other metals, with the view, I think, of improvement in the chemical qualities of the amalgam; though some seem to have had in view the improvement of the physical qualities as well. The study I now give is to be regarded as primary, the question being, what modifications are produced by moderate additions of other metals? and is intended to serve as a basis for finding formulæ for modified alloys of suitable physical qualities for filling teeth, not for pointing out the specific compounds. To this end I have selected the formula, silver 65, tin 35, as the basis with which a primary trial of the metals usually used for the modifications should be made. To this formula I have added gold, platinum, copper, zinc, bismuth, cadmium, lead, and aluminum separately, in the proportion of five per cent. in each instance. I have cast the ingots in two series, a month intervening between the times of casting. Each series was cast from one lot of silver and tin, so as to avoid any deception by possible differences in the purity of these metals. The result from the two series were so nearly the same that it would be useless to give both in the exhibit which I offer. The exact formula weighed into the crucible is, 61.75 parts of silver, 33.25 parts of tin, and 5 parts for the modifying metal.

Each alloy was tested fresh-cut, annealed in a boiling water bath for fifteen minutes, at 130° F., for two days and for seven days. As the results from the several annealings were practically the same, the results are given for the alloys fresh-cut and annealed. The specific gravity of these showed the same condensation in the formation of the alloys as has been noticed in case of the unmodified alloys, except in case of the alloy containing five per cent. of aluminum. This ingot gave the exact mean specific gravity of the metals weighed into the crucible to the second decimal point. It was a beautiful ingot, remarkably white, and very perfect.

Gold.—The addition of gold in the proportion of five per cent. seems to give a little softer working property, and slows the setting of the mass. The mass has something more of the pasty character, and the fillings made of the annealed alloy are apt to finish very soft, the surface being so springy that it is difficult to make a good finish. It takes a little less mercury than the unmodified alloy, and the flow is a little more. The amalgam is very tough, and bears a heavy stress before crushing. The shrinkage expansion range is reduced three points.

Platinum.—The appearance of the mass made of this alloy is very remarkable. That from the fresh-cut alloy is fairly white, but that from the annealed alloy is very dark, and, in kneading, blackens the hand to an extraordinary degree with a grayish blue black that is rather difficult to remove. The mass looks dirty, and the finished filling is dark. The mass has a very peculiar softness to the feel under the instrument. The setting is slowed considerably. It flows badly. The shrinkage expansion range is increased, and lies a little higher in the scale.

Copper.—This alloy, fresh-cut, sets very quickly. The mass makes up soft, but it becomes hard almost immediately it is left to itself. I had some difficulty in getting good fillings of the fresh-cut alloy on account of this extreme quickness of setting. The annealed alloy makes a very soft, pleasant-working mass, and the setting is as slow as in the unmodified alloy. Expansion and the expansion shrinkage range is markedly increased, the flow is diminished, and the crushing stress is the greatest of the series.

Zinc.—This alloy is very remarkable for the amount and slowness of its expansion. In the fresh-cut alloy the expansion continued forty days. The expansion of the unmodified silver 75, tin 25 alloy, which is nearly the same in amount, is completed in about eight days. The expansion in the fillings from the annealed alloy, which gave but nine points, was not completed until thirty days had elapsed. It will be seen by the table that the expansion shrinkage range is increased to fifty-nine points, and is placed much higher in the scale. The mass from this alloy is also remarkable for its adhesion to the walls of the cavity. Amalgam from an unmodified alloy, in its expansion, will slip squarely up in the tube if not held down by roughness of the walls, but that from this zinc modification does not slip up at all, no matter how perfect the walls of the tube, but rounds up in the center, the margins being held down, apparently, by adhesion. Still, when I came to empty the tubes, there were no signs of this adhesion. They came out clean and perfect.

The fresh-cut alloy is caused to set much quicker, so that I had much difficulty in getting good fillings. With the annealed alloy this was much improved, but it still set very quickly. Otherwise, the mass from the annealed alloy worked very well. The flow is decidedly decreased, and is the least of any of the series of alloys, while the resistance to crushing is good. In the handling it gives strongly the impression of brittleness. This alloy requires more mercury than the unmodified alloys.

Bismuth.—This alloy is remarkable for the readiness with which it amalgamates with mercury, and the small amount of mercury it requires. Most alloys containing sixty-five per cent. of silver amalgamate tardily, but bismuth removes all of this, and makes the amalgamation quick and easy. The working property is very soft, and the mass so springy that it is difficult to make good margins for microscopic examination, or to make the margins close all around the filling at the same time. When it is touched at one place it will spring away in another. The amalgam is very dark. The expansion shrinkage range is reduced, the flow increased, and the resistance to crushing is reduced.

Cadmium.—This is emphatically the active element. Its expansion of one hundred points is made in nine days, then there is a drop of one point within five days, after which it remains stationary. But annealing removes nearly all of that, so that its range is ninety-five points. It requires a large amount of mercury, sets as quickly as the zinc alloy, and must be worked quickly even when fully annealed. The amalgam is very white, and the fillings are beautiful. In its expansions it slips squarely up the margins, if the walls are smooth, and remains flat on the surface. The flow is increased.

Lead.—The principal reason for adding this alloy was the fact that our metals are so frequently contaminated with lead that I thought it well to know what effect it might have. It amalgamates almost as readily as that containing bismuth. The working property is very soft; the setting is slowed enough so that the fresh-cut alloy gives plenty of time. The amalgam is very dark. The expansion shrinkage range is unaffected, and the flow is increased.

Aluminum.—My first effort to make a filling of the alloy containing five per cent. of aluminum was a failure. It amalgamated nicely, forming a very white, soft mass, but it was soon too hot to handle. I lapped it about the bulb of a thermometer the best I could, but imperfectly, and the mercury ran up to 186° F. By the time I was through with this observation the mass had begun to fall into a dark powder, and very soon seemed to have disintegrated. I found that the dark powder would cohere a little when pressed together, and tried to make a filling of it, but was only partially successful. After a few efforts I succeeded in making a filling, and finally several, of the soft mass before the disintegration began. When packed into the tube it did not disintegrate, but the tubes became very hot—much too hot to hold in the hand. In handling the material I received the impression that a gas was being formed. The steel tubes, and the instruments used in packing, were corroded and darkened. The fillings made have expanded enormously. That which I thought the best filling at the time of making gave during the first twenty-four hours an expansion of 120 points; at the end of the second day 181; at the end of the third day 217 points; and so on diminishing, but it did not stop. I followed it for forty-three days, when it passed beyond the capacity of my micrometer, having made 445 points expansion. Now, after a little over two months, it looks as though one fourth of the material was above the margin of the cavity.

In considering aluminum, it should be remembered that it is so light that five per cent. by weight is nearly twenty per cent. of the bulk. I therefore made new ingots with one per cent. of aluminum, retaining the proportion of 65 to 35 between the tin and silver. In mixing this with mercury the heat developed was not too great for ordinary handling, but other phenomena occurred that may be of interest. The mix was kneaded as usual, and made a very nice pliant mass. While this mass was on the scale-pan being weighed I thought I saw a movement in it, and watching it closely I saw that it was swelling up and becoming larger. On placing it in the palm of my hand and rekneading it, a distinct crepitus of bursting gas-bubbles was heard. This gas was kneaded out and it reformed, and was again kneaded out. After repeating this several times the filling was made. This phenomenon occurred with every mix of this alloy, and there can be no question as to the formation of a gas. Even after the gas was several times kneaded out and the fillings made, the surface was more or less blistered with forming gas-bubbles. When first mixed the mass was very white, but in connection with the gas formation it became dark in color. The working property of the mass is soft and the setting slow, so that there is plenty of time, and to spare, in making fillings of it. When annealed it was very slow in setting; and the mass was peculiar for its combined softness and apparent dryness. It also exhibited the same gas formation. The filling from the fresh-cut alloy gave an expansion of 166 points during forty-four days that followed. Like the zinc alloy, it adheres to the walls of the tube and rounds up in the center, and the surface had become so much rounded that the the steel disk fixed in its surface for the contact point of the micrometer fell away, and the measurement was lost. During the last four days there had been an expansion of four points. The fillings from the annealed alloy gave expansions from twenty-five to forty-eight points; that sample annealed in boiling water expanding the most, and that annealed one week at 130° F. expanding the least. These expansions were very slow, and presented the remarkable phenomenon of being stationary from the beginning of the second day to about the fifth day (all of the fillings from the annealed alloy), when it began again slowly, and continued about forty days.

There seems to be no reason why we should not have white alloys, but it is clear that we must be very cautious in the use of zinc for this purpose. The formula, silver 68.5, tin 25.5, gold 5, zinc 1, has now been watched long enough to assure its success. The amalgam is very white, requires a long time in annealing to produce a good working property, and has good strength. The formula silver 68.5, tin 25.5, gold 4, zinc 1, bismuth 1, is also successful as to shrinkage and expansion—has a little softer working property, but is not so white nor so strong as the former. I think it quite possible that its action may be different in some degree if it is first combined with copper, for which it seems to have a strong affinity. I shall expect determinations made from this table to limit experimental work to a narrow compass, and render the finding of formulæ for alloys of satisfactory chemical qualities, that have also good physical qualities, a matter of little difficulty.

[These stupendous studies of Dr. Black's are to be regarded as still incomplete, so that although valuable guides for clinical practice may be deduced from them, they are not as yet in such state that broad generalizations can be deduced with any degree of safety. It is necessary therefore to treat them as records of fact, which do not admit of that condensation to which most works may be properly subjected.—H. H. B.]

ON THE EARLIEST DEVELOPMENT OF THE MOLARS IN HUMAN BEINGS.

BY WILHELM LECHE,

Professor of Zoology in Stockholms Hogskola,* Odontolozisk Tidshuft.

Translated for The Compendium by Ernst Sjöberg, Stockholm, Sweden.

A question upon which but little has been recorded is that of the earliest development of the permanent molars. The very long period which elapses between the earliest formation of these teeth, and their cutting through the gums—the nucleus of the second molar appears in the fetus between the seventh and eighth month, but it does not cut through the gums till the age of ten or twelve years—even this fact is peculiar, as it differs entirely from the course of modifications in development usually followed in mammals. In order to solve this problem, I have made examination of complete microscopical cuttings from a number of human jaws in different stages of development, especially for this purpose.

The following eleven stages have been examined from a frontal cut:

Stage A: embryo 7½ months old.
Stage B: embryo 8 months old.
Stage C: child 3 months, 1 day old.
Stage D: child 3 months, 8 days old.
Stage E: child 4 months, 15 days old.
Stage F: child 6 months, 2 days old.
Stage G: child 8 months, 10 days old.
Stage H: child 8 months, 29 days old.
Stage I: child 11 months, 10 days old.
Stage K: child 1 year, 3 months, 2 days old.
Stage L: child 1 year, 10 months, 9 days old.

THE FIRST MOLAR.

Stage A. A thickening in the deep free edge of the enamel border forms (in the middle of the first milk molars) the bud-like enamel organ of the first permanent molars. A tightening of the surrounding membrane forms the socket of the tooth. (Fig 1.) The extreme breadth of the enamel organ in this stage is 0.10 mm.

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* University of Stockholm.

Stage B. The enamel organ which has an extreme breadth of 0.11 mm., resembles that of the preceding stage, but is distinctly indented in the under periphery. (Fig. 2.)

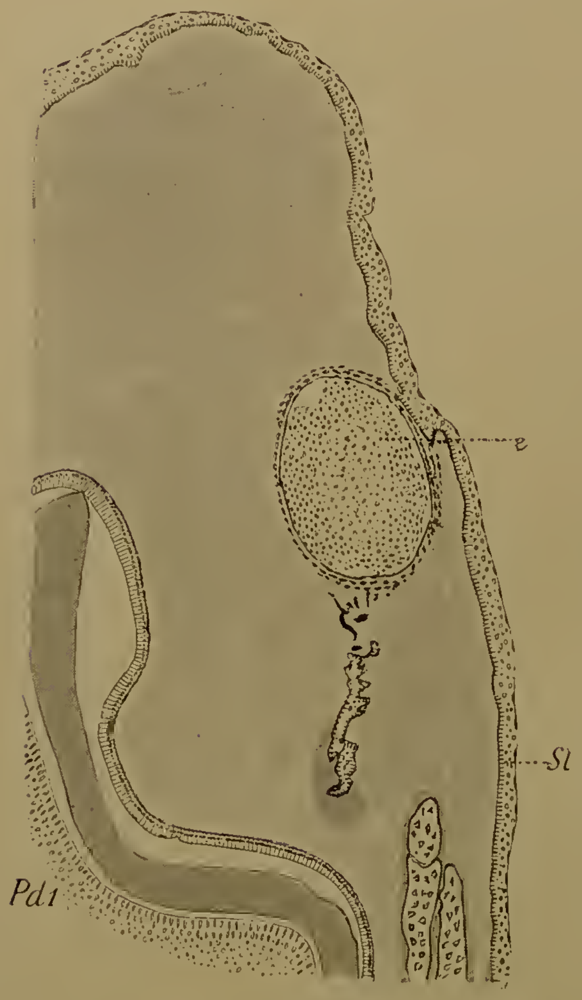

Fig. 1.

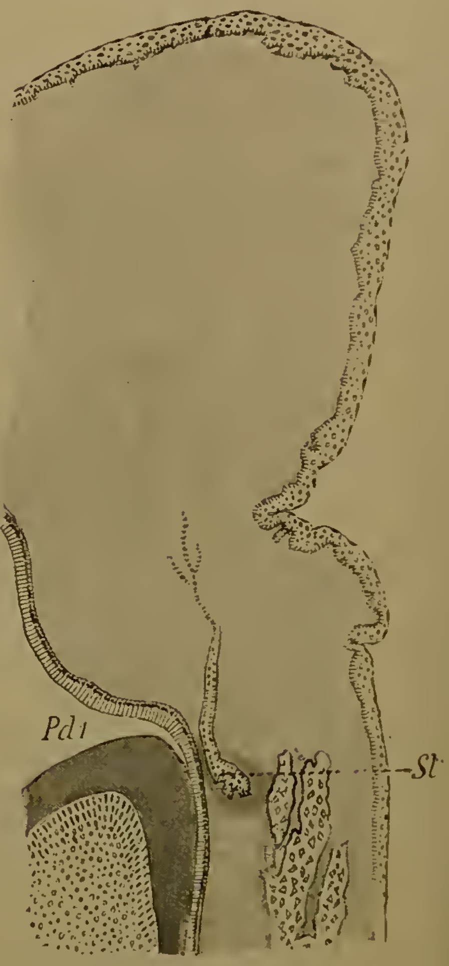

Fig. 2.

Fig. 1. Frontal cut through a portion of the lower jaw of the human embryo 7½ months old. Pd 1, first milk molar. Sl, bud-like enamel organ of the first molar; e, epithelial cells.

The above and also the following figures are drawn with the help of the camera lucida, and exhibit, with a few specially noted exceptions, the preparations enlarged ten times the original size, and are so placed that the right side from the reader corresponds with the lingual, the left with the labial surface.

Fig. 2. Embryo, 8 months old. See Fig. 1 for description.

Röse's declaration, that there is no trace of molars in the newborn infant, is more in apparent than real conflict with these facts, for R. points out that the enamel border, where the molars afterwards cut through, is slightly swollen, a statement which evidently implies that the enamel organ of the teeth in question, at the child's birth, is in the phase of development which I have defined as bud-like. Morgenstern (1894) gives a drawing of a bud-like enamel organ to the first molar in an embryo of only about 4 months' growth, which it is impossible to fail to recognize.

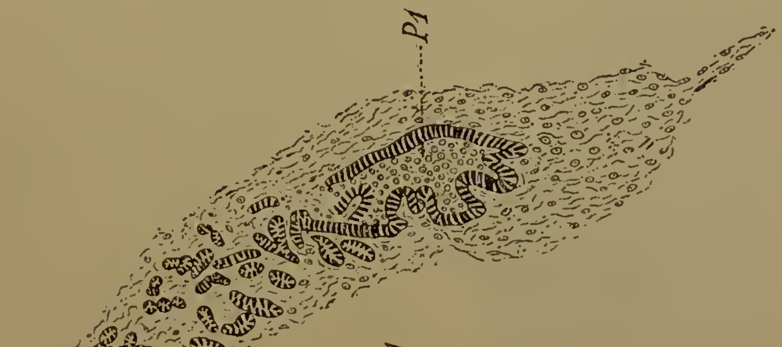

FIG. 3a.

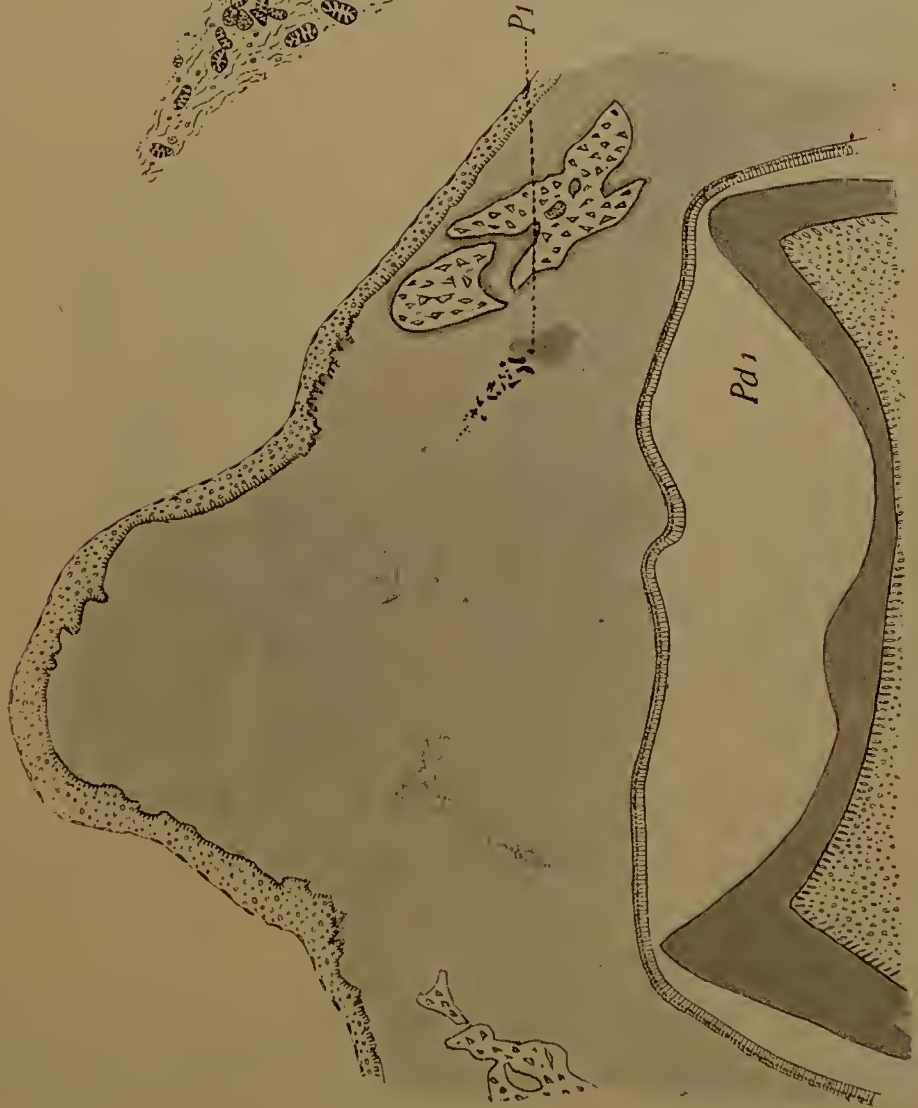

FIG. 3.

In the stages C and D the first molar is not larger—its extreme breadth is about 0.10 mm.—than in the earlier stages (Fig. 3 and 3 a). It is worthy of remark that the permanent front and corner teeth have already reached a much higher degree of development.

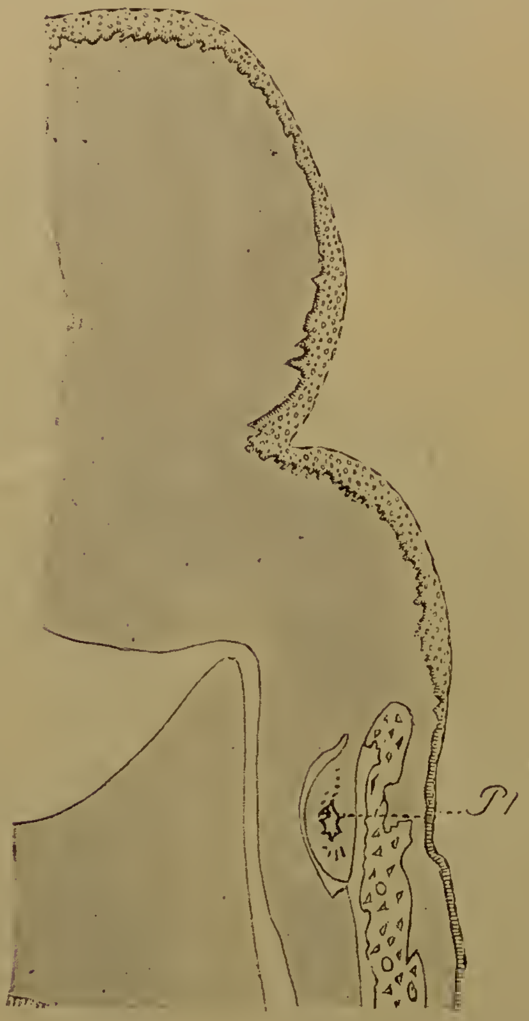

Fig. 4.

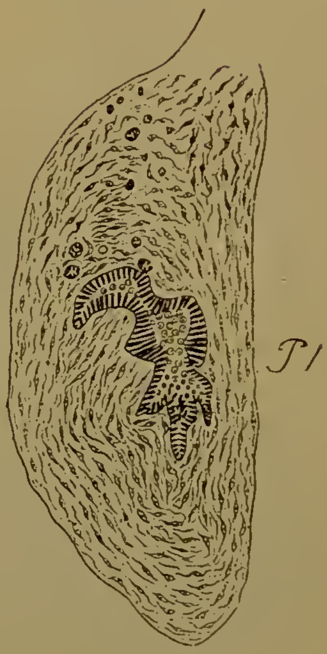

Fig. 4 a.

Fig. 4. Child 4 months and 15 days old. Compare with the preceding figures.

Fig. 4 a. Pl greatly enlarged.

Stage E. The enamel organ of the molars in the human being, even in a phase which doubtless corresponds with the bud-like stage in other mammals, is provided with one or several irregular slight indentations, a peculiarity I have not met with in other mammals. It is therefore difficult to decide when the enamel organ in the human being ought to be regarded as having reached the concave stage, that is to say, when is the lower periphery of the bud-like organ of enamel pressed up against the upper periphery, by the eruption of the dental tissue. Without doubt the enamel organ, as shown in the preceding figures (4 and 4 a) though no larger than in stage D, is in the commencement of the concave stage. This is corroborated on examining stages F, G and H, all of which are distinguished by distinct concave enamel organs. The size is also increased; the extreme breadth being in the F 0, 19, stage G 0, 13, and in stage H 0, 17 mm. The nucleus of the molars in stage G (Fig. 5) is distinguished, not only by its smaller size, but also by the portion of enamel border with which it is connected, remaining in larger proportions than in that of the others. We thus find that the process of development of the tooth nucleus in question is subject to very considerable variations.

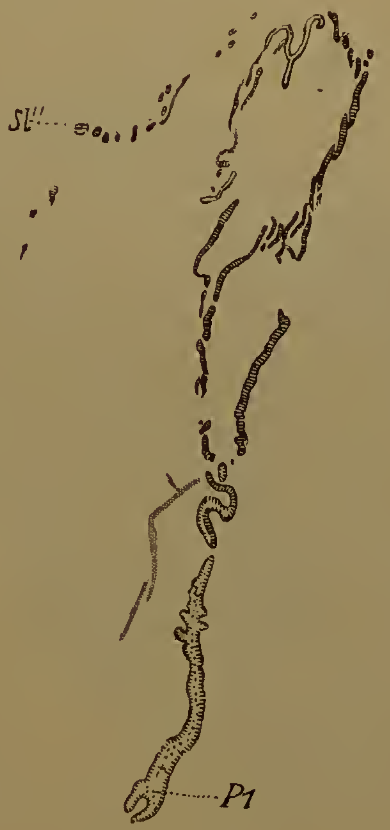

FIG. 5.

Fig. 5. Child 8 months, 10 days old. P′ Concave enamel organ of the first permanent grinder. Sl″ remains of ligament between the enamel border and the first milk double tooth.

Stage I. The concave enamel organ, which is considerably larger than in the preceding stages, varies so far that the opening turns outward, and not towards the lower periphery of the jaw as otherwise. Its being partially inclosed in the jawbone is also a certain proof of its higher phase of development.

Stage K. The concave enamel organ on the labial side is provided with several filaments proceeding from the enamel border.

Stage L shows the enamel and tooth, and the whole of the enamel organ is enclosed in an alveole.

THE SECOND MOLAR.

In the stages A and B this tooth is only shown as a slight swelling of the enamel border, enclosed in membrane on the lingual side of the corresponding milk tooth. There are still partial remains of the ligament connecting the enamel border with the last named tooth. (Fig. 6.) The nucleus of the second molar is thus somewhat less developed than that of the first at the same stage.

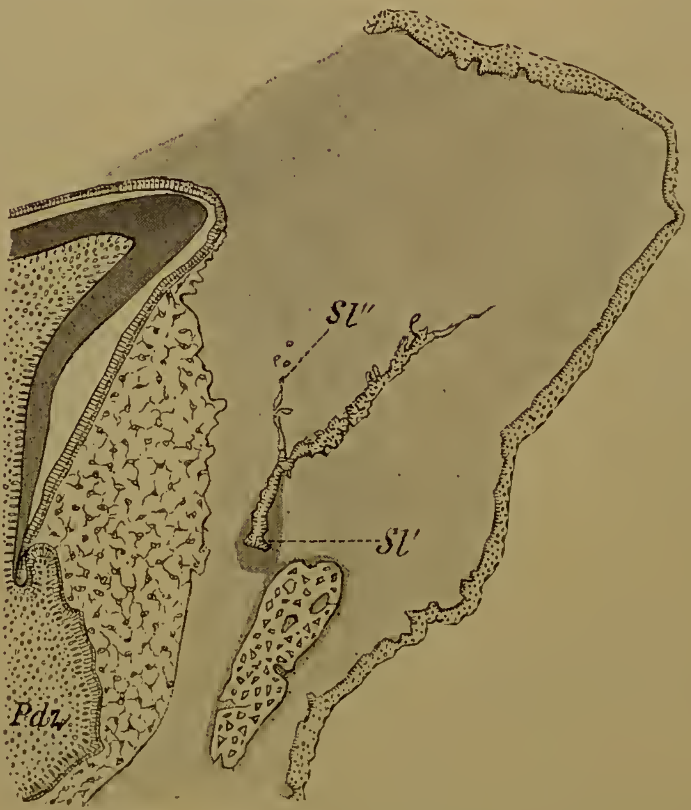

Fig. 6.

Fig. 6. Embryo 7½ months old. Pd 2, second milk grinder: Sl′, faint sign of the second permanent molar; Sl″ connecting ligament between the enamel border and the second milk grinder.

The enamel organ does not become concave till stages F and G, but here also the second molar is less developed than the first.

According to Röse the enamel organ of this tooth does not reach the concave stage till the child is a year and a half old. How far this diversity is dependent on individual variation, or on different interpretation, I must leave undecided.

In stage I the second molar presents the same somewhat irregular form as the first. It is thus possible that the enamel organs in the said individual before us are not quite normal.

In stages K and L the tooth is in essentials the same as the one preceding. (See above.)

From the observations given above, it appears that the nuclei of the molars in man are formed early. The first molar begins in the embryo at the fourth month (Morgenstern), but that the process of development of the earlier stages is so slow, that it may for the most part be looked upon as being at a standstill. While, for instance, the first molar in the four months embryo is about as much developed (bud-like) as the front and corner teeth, and is about the same in size, the difference in an embryo 7½ months old is very considerable, the enamel organs of the latter having already reached the bell-like stage and a considerable size, while the molar remains in the bud-like stage, and has an almost shriveled appearance. The molars remain for more than a year and a half, as small, more or less irregularly formed enamel organs, which first reach the concave stage when the child is 4 to 6 months old, for even when the child has reached the age of a year and three months, they still show no signs of future development. Not till the child is a year and a half old do they begin to develop at a speedier rate.

It is further evident, by the above investigations, that no inconsiderable individual variations take place in the development of the molars in human beings. An examination of several individuals would be necessary to eliminate "exceptional cases," and to determine a course of development which one might call "typical."

An investigation of the phases of development which lie between stages K (1 year, 3 months) and L (1 year, 10 months), examined by me, would be of special interest. I have had no opportunity for such an investigation.

Finally, I must mention the occurrence of a superfluous enamel organ of a molar in stage C (Fig. 7). This dental nucleus lies in a hollow of the jawbone on the inner side of the first milk grinder, and in front of the nucleus of the first molar. It is considerably larger than the latter (the extreme height being 0.27, the extreme breadth 0.26 mm.), and it is at a higher (older) stage of development. The enamel organ is concave. This discovery can claim a certain interest as it points to an historic older phase in the development of man, to a phase, when he still had three pre-molars, which we know is the characteristic of the apes in the New World.

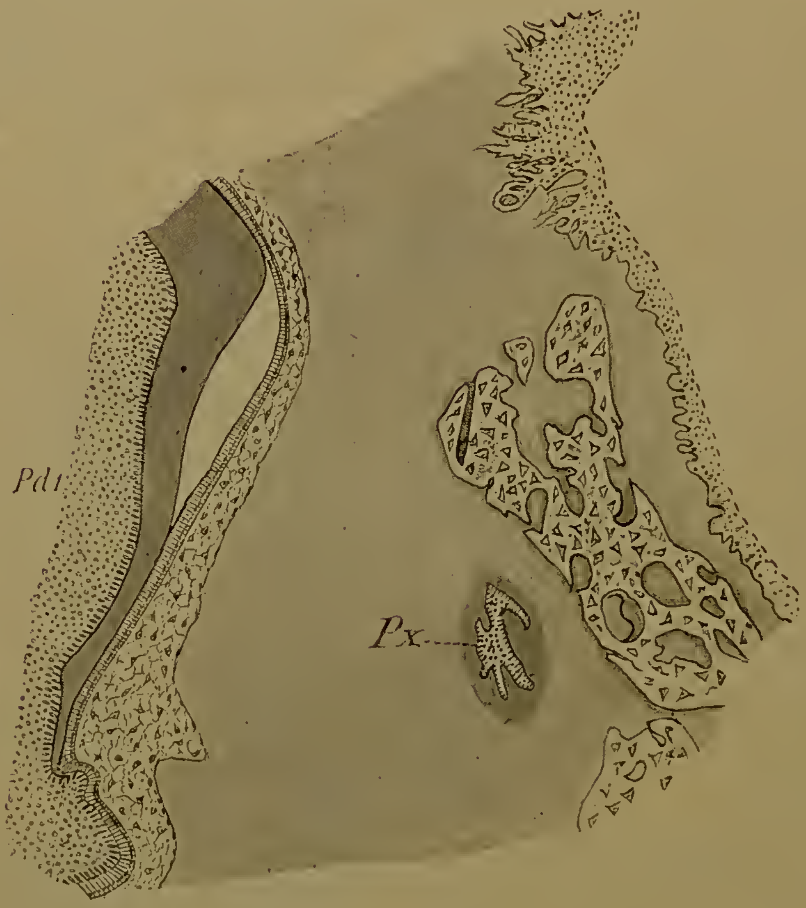

FIG. 7.

Fig. 7. Child 3 month and 1 day old. Px, concave enamel organ of a superfluous permanent molar. Compare with Fig. 1.

STUDIES IN THE MAXILLARY BONES.

M. H. CROYER, M.D., D.D.S., PHILADELPHIA.

Dental Cosmos.

Dr. M. H. Croyer, the Professor of Oral Surgery in the University of Pennsylvania, has introduced a method of study in the applied anatomy of the head and jaws, which has given some astounding results. Sections are made of the bones of the face, the teeth and contiguous parts by means of saws, files, burs and chisels. These sections are both complete and partial, and were undertaken to discover the actual sources of obscure maxillary diseases. The results thus far show all of the former treatises of anatomy to contain numerous errors in their descriptions of maxillary anatomy.

The infraorbital canal described as a canal channeled from the floor of the orbit through the roof of the maxillary sinus is found in many cases to be a distinct and free bony tube traversing the superior anterior portions of the antrum.

In some cases the floor of the antrum is found to descend until a series of depressions are formed corresponding with the spaces between the buccal and palatal roots of the molar. So thin was this wall found in some instances, that extraction of a molar tooth would inevitably be followed by fracture of the floor of the antrum. An abscess upon either root of any of these teeth must almost certainly be followed by the escape of pus into the antrum. This thin covering is far from uncommon. It is, however, unusual in the negritic races.

The orifice of exit from the sinus into the middle meatus of the nose is seen to be near the roof of the antrum, and in several cases distinctly in the roof. In all cases the opening is in such situation as to render impossible any attempt to pass a probe through it in the living subject.

In some cases the excavation of the antrum extended clear into the substance of the infraorbital ridge, forming a second, an infraorbital sinus. In tracing the direction of exit from the antrum, a probe was passed through the orifice in several of the cases when the opening was near the roof, and was found to enter directly and easily the frontal sinus, showing that catarrhal discharges from the frontal sinus could readily enter the antrum. Exudations from the ethmoidal cells could, and no doubt sometimes do, also enter the antrum.

Dr. Croyer traces the development of the maxillary sinus from the fourth month of fetal life by an invagination of the nasal mucous membrane, and states that it increases in size until old age, when its walls are found extremely thin.

In most cases it was found that the divisions of the posterior dental artery passed along upon, not in, the wall of the antrum, being overlaid by muco-periosteum branches, pierce the bone and are distributed to the teeth.

In the inferior maxilla the passage, called the inferior dental canal, is found to be a distinct tube, whose walls exhibit a lace-like form; it is markedly cribriform to prevent the exit of vessels and nerves. The tube, having at its first portion almost solid walls, is pierced by a constantly increasing number of openings as it goes forward, corresponding with the amplified neural and vascular distribution. Small tubes diverge from the main tube to the roots of the teeth, each canal being more curved than that posterior to it. The main canal passes beyond the mental foramen, where it divides a distinct recurrent canal opening at the mental foramen and transmitting the mental vessels and nerves.

Sections at various ages show the portions of the jaw between the symphysis and mental foramen, and mental foramen and the ramus, to increase in length. The teeth are carried forward from their positions of eruption, and the tubes transmitting vessels and nerves to each root originally straight, become curved by the forward movement of the cancellated structure of the jaw; the maxillary tube is also carried forward, but its extremity being fixed at the mental foramen, a bend is formed in the tube, giving the recurrent arm noted.

The bone about the root of the lower second bicuspid is unusually dense, and the anterior root of the first lower molar is in close apposition with that of the second bicuspid, which renders extraction of the latter tooth difficult when all of the teeth are in position.

Transverse sections of the inferior maxilla show that in many cases the inferior dental canal cannot be readily distinguished from passages in the cancellated tissue, so that attempts at general extirpation of the canal contents might result in merely cutting away a mass of marrow, the instruments escaping the canal entirely.

Several of the sections show the roots of lower molars penetrating the roof of the canal; this might explain many cases of trifacial neuralgia, and again, should suppuration occur about the apex of such a root, it must inevitably affect the canal contents.

Studies as to the exact anatomical relations of non-erupted third lower molars are full of interest. It is very probable that impacted third molars are more frequent than is thought. One of the sections shows the original tooth follicle to have occupied a horizontal position; the tooth is contained in a distinct long capsule. The apex of the root presses into the inferior dental canal, the crown of the tooth has impinged upon the distal root of the second molar, causing resorption of the root; we have here two possible sources of neuralgia. Another case shows the crown of the tooth pointing inward and downward, so that should it erupt it would appear upon the inner maxillary wall. Another case shows the tooth to lie almost in the substance of the bone at the angle of the jaw, entirely beneath the inferior dental canal.

There appears to have been an inflammatory reaction of the pericementum of some of these cases, hypercementosis being marked in them; the surrounding bone has also increased in density.

ON THE FORMATION AND STRUCTURE OF ENAMELS.

J. L. WILLIAMS, D.D.S., L.D.S., LONDON, ENG.

Dental Cosmos.

(The substance of the series of papers was read before the Royal Society of Great Britain, December 12, 1895.)

After reviewing several of the theories relative to the process of enamel formation, Dr. Williams believes that many errors and false deductions are due to too limited a technique in the preparation of specimens. His sections are prepared after several methods, more than thirty differentiating strains employed, and the sections mounted in various media. The formation of the primary band, its change of form; the appearance of the dentine germ and follicular wall are traced, together with the appearance of the stellate reticulum, next the change of form of the cells of the inner tunic of the enamel organ, which, becoming columnar, are now the ameloblastic cells. To this point Dr. Williams's findings are in accord with the accepted doctrines relative to tooth formation. Additional attention is called to the cells of the stratum intermedium, the layer of epithelial cells lying between the ameloblastic layer and the stellate reticulum, to which are ascribed an important secretory function. At the stage immediately preceding the formation of the first layer of dentine, the tooth germ rests in a trough of bone surrounded upon all sides by loose connective tissue; in the floor of the trough lie the vessels and nerves; the dentine germ is now seen to have a well-marked vascular supply. The fibrous follicular wall covering the external wall of the enamel organ is also seen to have a distinct vascular supply. Preparation of the first formed layer of enamel shows no trace of prismatic elements in the tissues; but a fibrous layer, parallel with the ends of the ameloblasts, having small globular masses irregularly distributed in the meshes. Another layer of fibers runs at right angles to the first. There are two distinct lines of demarcation between the ameloblasts and the tissues upon either side, one separating the cells of the stratum intermedium from the ameloblasts, the other separating these latter cells from the last formed enamel. Dr. Williams terms these the outer and inner ameloblastic membranes. Attention is called to the demonstrable difference between these structures, and what has been known as the membrana præformativa.

The membranes appear after the ameloblasts are clearly differentiated, and are persistent to the end of enamel formation.

Highly magnified and properly prepared sections show the stellate reticulum to be composed of large polygonal cells with well-marked nuclei. The contents of the cells of this structure becoming altered, softened and watery, are easily removable in preparing specimens, so that ordinary sections of the enamel organs show only the cell outlines, the cell contents having been lost in the process of preparation.

Shortly after the first layers of enamel have been deposited, the stellate reticulum disappears in great part, and the external fibrous layer of the enamel organ becomes applied to the stratum intermedium. At this point distinct papillæ appear, covered by the cells of the stratum intermedium and a distinct secreting organ is formed, whose function is the secreting of material which passes into the ameloblasts for the forming of enamels.

In order to demonstrate the minutiæ of the succeeding processes, lenses giving a magnification of 3,000 diameters and very clear definition are necessary.

An unbroken ameloblastic layer is seen to be persistent. Dr. Williams intimates that any generation of new ameloblasts must be from the existing ameloblasts, and not from the cells of the stratum intermedium. In observing the early formed enamel and the ameloblasts, it will be observed that the axes of cells and enamel elements differ greatly; also, that there is a marked difference in their individual forms, showing that enamel elements are not calcified ameloblasts. An unmistakable fibrous structure is seen in newly formed enamels, the fibers running like warp and woof.

The droplets of calcoglobulin which are seen in the ameloblasts, are irregular in size, distribution and function, and hence cannot be the progenitors of the enamel elements which are of uniform size and distribution. Dr. Williams suggests that the small masses of calcoglobulin are found in the cells of the stratum intermedium, as a secretion, and states that the belief in the formation of enamel prisms from such masses of calcoglobulin does not explain the anatomical structure of the prisms. It is concluded from a study of decalcified specimens that the process of enamel calcification closely resembles the process of petrifaction of vegetable substances.

Partially decalcified sections show significant reactions to stains. The partially decalcified youngest enamel has an albuminous fibrous structure which stains in the same manner as the contents of the neighboring blood-vessels. The granular matter left after removal of the albumen responds to stains as the contents of the ameloblasts, showing two distinct elements in the enamel. An examination of the latest layer of enamel will show the existence of the two distinct materials; first, globules of calcoglobulin of various sizes; second, a series of globular bodies of uniform size. These latter are the enamel globules. The enamel prisms are built up of the globules, the calcoglobulin forming the interprismatic substance; in decalcification the latter is first removed, the globules are less soluble and make the varicosities seen in partially decalcified enamel prisms.

The globules may be seen in the bodies of the ameloblasts, and only to be differentiated by very fine lenses; as many as six globules may be seen between the nucleus and the proximal ends of an ameloblast. Dr. Williams suggets that these globules probably have their origin in the nuclei of the ameloblasts.

At the completion of amelification all traces of ameloblasts are lost, and only several rows of these globular bodies are to be seen. The globules are deposited with great regularity and uniformity, so that the varicosities in adjoining rods correspond very closely.

The globules are connected longitudinally and laterally by plasmic strings which become calcified. The globules are deposited in layers, surrounded by the calcoglobulin, and upon organization of the older layers the enamel elements assume their typical prismatic forms.

STRUCTURE OF COMPLETELY FORMED ENAMEL.

The technical difficulties attending the making of sections of mature enamel of sufficient thinness to trace its structure are great: the section should be so thin that it reprcsents but the thickness of one prism, so that the image will not be confused by underlying prisms.

The varicosities which mark the individual enamel globules of each rod or prism are seen to be in adjoining prisms opposite to one another, occasionally appearing fused together, others are seen to be connected by calcified plasmic strings.

To clearly bring out these details, the optical apparatus, objective, condenser and camera lenses must be adjusted with the utmost precision; slight variations in the adjustment will give varying pictures.

The enamel next to the dentine shows the varicosities but slightly, the elements are more or less fused together, approaching the outer surface of the enamel they become more distinct.

When specimens are subjected to the action of acids for some hours, the interprismatic substance is seen to be more readily acted upon than are the enamel globules. Sections prepared of carious enamel at various stages show, by the gradual decalcification, the stages of enamel building, the individual globules become distinct, as do also the longitudinal and lateral plasmic strings which join the globules.

[This review deals only with matters in Dr. Williams's series of essays which are entirely new; avoiding even mention of the previous opinions of other embryologists.]

THE GLENOID FOSSA AND THE MOVEMENTS OF THE MANDIBLE.

W. E. WALKER, PASS CHRISTIAN, MISS.

Dental Cosmos, January, 1896.

It has generally been held by anatomists, as implied in their descriptions of the temporo-maxillary articulation, that its path in its forward and lateral movements is horizontal; moreover, it is tacitly assumed by the dentist that the planes of the movements of the articulation and of the occlusion of the teeth are parallel. Dr. Walker demonstrates both of these premises to be erroneous. He points out that owing to the form of the glenoid fossa, the eminentia articularis being at a lower point than the middle of the glenoid arch, that the head of the bone must necessarily descend in its anterior excursion, moving forward and downward. It is shown that the line of occlusion is less than at right angles to the perpendicular facial line; its angle averages about 75 per cent., that is, the line of occlusion is 15° from the horizontal. The average line of movement of the head of the mandible, in its forward and downward journey, is on an average about 35° from the horizontal.

The extent to which the head of the bone descends from its highest position is governed by the extent of the incisor overbite. There is a point upon the posterior margin of the ramus, above which, while the head of the bone moves forward, the angle portion of the ramus backward, this field or pivotal point is about 15 mm. ($\frac{5}{8}$ inch) below the upper surface of the condyle.

Owing to the form of the articulation, there is a double rocking movement given the mandible, one lateral, from side to side, as though swinging upon a longitudinal axis; the other longitudinal, as though moving on a sliding, transverse axis.

These facts were seen to be of direct clinical import in the accurate adjustment of the occlusion of artificial teeth. The representative anatomical articulator, that of Bonwill, has its articular plane parallel to that of the occlusion, and both are horizontal.

Full dentures mounted in this articulator according to anatomical principles based upon its correctness, were found when placed in the mouth not to reproduce a correct anatomical occlusion; the difference being clearly traceable to the parallelism of the planes of articulation and of occlusion.

The several angles given above are the average; the angle and extent of lateral movement and of protrusion vary with the individual. Dr. Walker has constructed an articulator which is adjustable to any angle and degree of mobility found in the movements of mastication. The proof of its mechanical correctness may be seen by placing it in casts of a perfect denture; first measuring the angles of the mandibular head movement, setting the articulator joints at this angle; the movements of the articulator jaws will then reproduce those of the natural jaws. The accuracy may be readily seen in those full dentures whose cusps are slightly abraded.

By means of an instrument devised for the accurate measurement of the angles (the facial clinometer), Dr. Walker has determined a lack of bilateral symmetry in the movements of the condyle, citing one case where the angle was but one degree upon one side and ten degrees upon the other. In another case, the angle was but twenty-two degrees upon one side, and forty-four degrees upon the other.

[The description of the clinometer furnished in the report is not sufficiently clear to describe minutely its great accuracy, to which the reviewer can attest.]

NOTES ON FAUCHARD'S DISEASE.

DR. MOTY.

Revue Odontologique.

Translated for The Compendium by Dr. J. H. Spalding, Paris, France.

Fauchard's disease, described last century by a French doctor who gave it his name, is characterized by the spontaneous falling of sound teeth, before old age or without any appreciable universal disease. This is about all that Fauchard says about it.

The present investigations are inclined particularly towards the pathological anatomy of teeth affected by this disease, and they lead to important conclusions from a pathogenic point of view.

PATHOGENIC ANATOMY.

If a tooth lost through Fauchard's disease be examined, it is found sound in appearance, and the cause which provoked its decay would be believed to be on the exterior of the tooth. But if the pulp-cavity be opened with a chisel it is seen that this cavity is almost obliterated by successive deposits of secondary dentine.

The pulp-cavity in the molars is reduced to a hollow in the shape of a crescent, the concavity turned towards the crown; from the extremities of this crescent and from its convex side, the canals of the roots appear to be slightly enlarged.

It can be seen with the naked eye, but better with the microscope, that the dentine which obliterates the pulp-cavity is stratified in lines parallel with the occluding surface. The pulp-cavity of teeth with a single root, is lessened in all its dimensions and becomes narrower than the root-canal which follows it.

It is to be noted that no necrosis of the apex is to be found, nor are there any traces of absorption on the surface of the roots.

Investigations made with Nicholson's areometer by the chemist Mr. Bayrac, Doctor of Physical Science, showed a diminution of the comparative density of teeth affected by this disease. The pulp, repelled towards the orifice of the root canals, contains a great quantity of particles of dentine, a few being very large: however, far from showing signs of inflammation, the pulp is reduced to a fibrous state and seems to be deprived of vessels; its color is much paler than that of the pulp of an old man's tooth on the point of falling out.

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ARRANGEMENT OF THE REGULAR SESSION.

The Collegiate Year consists of one session, beginning in October and ending early in June.

EXAMINATIONS.

Attendance upon three regular winter courses of lectures will be required before final examination for the degree of Doctor of Dental Surgery. At the close of the first year, examinations are held in Chemistry, Materia Medica, Elementary Physiology Elementary Anatomy, Histology, and Osteology, and the second year upon General Anatomy and Physiology. If the student is not qualified, a second examination is afforded him at the beginning of the next winter session.

The final examination at the end of the course is in Operative Dentistry, Mechanical Dentistry, Metallurgy, Clinical Dentistry, Dental Pathology, Therapeutics, and Oral Surgery.

All applicants for advanced standing must pass the required examinations of this school, or furnish proof that they have passed equivalent examinations in some recognized Dental or Medical school.

Graduates of a recognized medical college will be admitted to the second year class without examination.

CONDITIONS OF ADMISSION.

Candidates for admission are required, First, to write an essay (not exceeding a page of foolscap) as a test of orthography and grammar; Second, to pass an examination in the English branches. A candidate who has received a collegiate degree, or passed the matriculate examination of a recognized college, or who has a certificate from a Normal, High, or Grammar School, or a teacher's certificate, properly attested, may enter without examination. **No Students admitted after October 10th.**

FEES.

Matriculation Fee (paid once only)	$ 5.00	Dissecting Fee (second year)	$10.00
Fee for One Course of Lectures	100.00	Graduation Fee (third year)	30.00

For detailed information and announcements address

EDWARD C. KIRK, Dean, Philadelphia, Pa.

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The Baltimore College of Dental Surgery, the first and for many years the only dental school, offers facilities for the study of dentistry proper, such as age and experience only can give. Its immense museum, complete apparatus, large and well arranged building, and carefully studied curriculum, give to its students great advantages and opportunities, both theoretical and practical, while its age gives its diploma a dignity far outranking all other colleges—a diploma honorably represented in all civilized countries, and held by the most distinguished members of the dental profession.

The fact that dentistry must be practically taught is fully recognized; the College Infirmary, a most complete, large and handsome hall, being daily filled with clean and respectable patients, of a class nearly equal to those of the average dentist. The infirmary is open all the year, students paying an entrance fee, which is deducted from those of the regular succeeding course.

The session begins October 1, closing in March. A large corps of demonstrators always present, put in actual practice the teachings of all lecturers in dentistry—leaving nothing undemonstrated. All methods are fully taught, all appliances and apparatus used; the making of instruments and the most elaborate gold and continuous-gum work, and all the cases arising in ordinary practice, with many which are rarely seen, carefully demonstrated.

The College has formed an alliance with the College of Physicians and Surgeons by which its students are privileged to attend all lectures and clinics. The patients of this medical school numbered last year over 40,000.

Graduates of the Baltimore College of Dental Surgery are required to attend but one session at the College of Physicians and Surgeons prior to presenting themselves as candidates for the degree of M.D. (See Catalogue.) In accordance with resolutions adopted by the National Association of Dental Faculties, which went into effect for the session of 1891 and 1892, the qualifications for entering the first year's course are a preliminary examination in the ordinary English branches.

TERMS OF GRADUATION.—Attendance on three winter courses of lectures in this College: as equivalent to one of these we accept one course in any reputable dental college. Graduates in Medicine can enter the Junior class.

BENEFICIARY STUDENTS.—Each State Dental Society is privileged to send one Beneficiary Student to this college at one-half the regular fees. This has been for some years an established feature of this college.

FEES.—Matriculation (paid once only), $5. Tuition fees, $100. Diploma fee, $30. Dissecting fee, $10.

Students corresponding with the Dean will please be careful to give full address, and direct their letters to

M. W. FOSTER, M.D., D.D.S., Dean,
No. 9 W. Franklin St., Baltimore, Md.

Pennsylvania College of Dental Surgery.

Eleventh St., below Spruce, corner of Clinton.

FORTY-SECOND ANNUAL SESSION, 1897-98.

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R. WALTER STARR, D.D.S., Instructor in Crown and Bridge Work.
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DR. R. HOLLENBACH,
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This College has accepted the requirements of the National Association of Dental Faculties with regard to admission and graduation of students. (See announcement for 1897-98, which can be procured from the Dean.)

THE SPRING AND FALL SESSIONS.

THE SPRING COURSE commences on the 6th of April and continues until June 20th. Fee, $50, which will be credited upon the fee for the regular session.

THE FALL COURSE will commence on September 6th, and continue until the first of October, and will be free to those who matriculate for the regular session.

Attendance upon the Spring and Fall Courses will be deemed equivalent to the term of pupilage under a private preceptor.

THE REGULAR SESSION

Will commence on October 1, 1897, and continue until the 2d of April ensuing. Twenty lectures will be delivered each week on the various branches taught.

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Lecture hours excepted, general clinical practice is available for the student continuously through the day. Competent instructors are always present.

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By an arrangement with Jefferson Medical College, such students as may desire to do so, can, if found qualified, obtain the two degrees, in Dentistry and Medicine, in five years. Students desiring to gradute in medicine are required to notify the Dean of their intention at the beginning of their second course.

FEES.

Matriculation (paid but once)	$ 5 00
For each year (Demonstrator's Ticket included)	100 00
Dissecting Fee	10 00
Diploma Fee	30 00

Board can be obtained at from $4 to $6 per week.

The Instruments and Tools required can be procured for from $35 to $45. This sum does not include the price of Dental engine.

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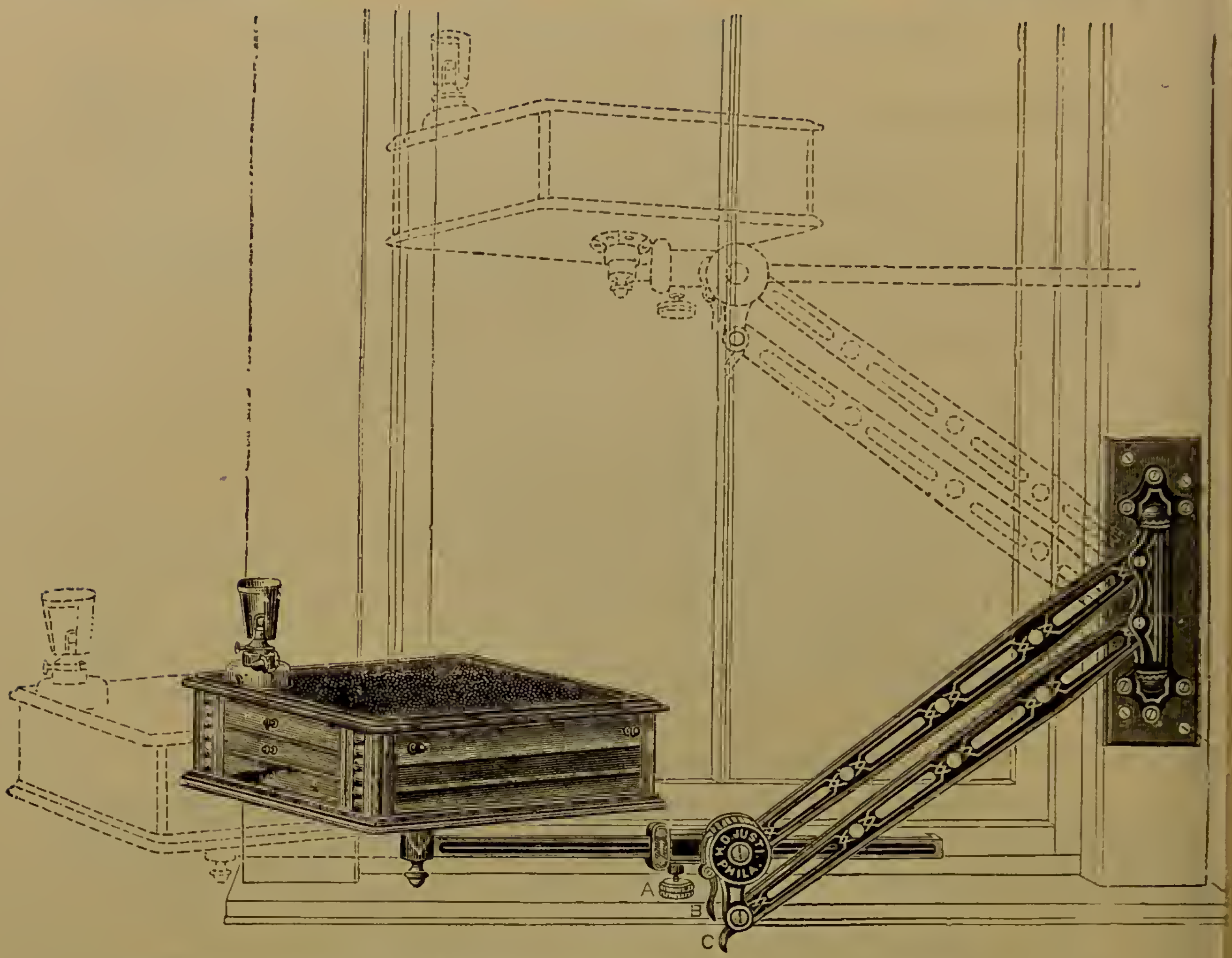

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The fact that the judges of six World's Fairs have awarded the highest medals for Artificial Teeth to our production is something to be proud of, and we are proud of it.

Our success is not accidental. We have worked constantly and earnestly for forty long years to reach perfection. Think of the knowledge and experience that can be crowded into that period.

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A PAIN RELIEVER IN DENTISTRY.

In the many conditions with which the dentist is daily brought in contact, nothing is more important than pain; and nothing more to the credit of the dentist, or more satisfactory to the patient, than the relief of pain.

In the pain produced by an exposed pulp, an abscessed root, pericementitis or pyorrhœa alveolaris and in neuralgia of the trigeminus, nothing is more potent than a ten grain dose of antikamnia, or preferably two five grain antikamnia tablets as indicated. If the neuralgia is of malarial origin or if the patient is of a rheumatoid diathesis, nothing will be so satisfactory and efficacious.

Many cases of odontalgia are of nervous origin; particularly is this so in persons of a neurotic type. Many pregnant women have odontalgia, whose origin is hysteria. Every dental practitioner has seen such cases. A full dose of antikamnia will give grateful relief. If some brother dentist while treating a diseased tooth leaves a broach broken off in the root canal (and this sometimes happens), and the patient comes to you for treatment, do not expect antikamnia to cure the trouble—it will relieve the pain while you are treating the condition, but it will not remove the cause.

Reflex neuroses are seen more often than otherwise in patients of a neuropathic type. These cases are frequently met with by observing dentists. Neuralgia from carious teeth affects sometimes the eye ball, supra-orbital nerve, the occipital portion of the head and in some cases the cervical vertebræ are involved; aural troubles are not infrequent. Of the latter trouble, how could it well be otherwise when there is such close connection between the teeth and the auditory apparatus by means of the fifth cranial nerve; besides this, the dental nerves are connected with the ear by other anastomoses, as well as through the Gasserian ganglion. The tensor tympani, tensor palati and tympanic plexus, receive fibers from the otic ganglion and also branches from the sympathetic.

Now is it peculiar, that changes in tissue or function of the nerve at the dental distribution should produce pain in the regions supplied by other filaments of the same nerves in their terminals? Frequently the excavation of dental caries will produce neuralgia in the ear and elsewhere. Painful ulcer of the auditory canal is sometimes dependent on caries of an upper molar. It is not claimed that antikamnia will cure this condition, but it is meant that it will relieve the pain while the tooth is being properly treated or extracted, as the condition demands.

In pulpitis without exposure, where the patient is too nervous to allow you to expose the pulp in order to apply the devitalizing dressing, pain is apt to follow. In just such cases antikamnia is the remedy and will not be found wanting. Frequently the mere filling of a cavity, the setting of a Logan crown or a bridge, will produce nervous irritation, which can be allayed admirably by this remedy.

Pain in the teeth may be produced by caries, exposed pulp, dead pulp, inflammation of the peridental membrane, etc., there is not a more potent factor in producing trigeminal neuralgia than phagedenic pericementitis.

Dental irritation from whatever cause, reflected to another branch of the trigeminus, however remote its anatomical distribution may be, is often apt to escape the notice of both the dentist and physician. Usually, cases of supra-orbital neuralgia, pain in the auditory canal, etc., are first seen by the physician, and is not relieved by treatment because the cause is not recognized. It is, therefore, imperative in the physician, that he be on the lookout for such conditions and send his patient to the dental surgeon, who should, while removing the cause, give his patient antikamnia to banish the pain. It contracts the arteriolæ and thus relieves congestion.

Sometimes after extracting, the septum and process are denuded of gum tissue. When exposed to the air, great pain supervenes for several days. This condition is markedly benefited by the administration of antikamnia.

Many instances might be cited where the use of this remedy is indicated but the well-informed dentist only needs to have his attention drawn to the remedy and his knowledge will make the needed application.

Antikamnia Tablets are never without monogram and should be crushed when very prompt effect is desired, and patients should be so instructed.

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5-gr. Tablet.

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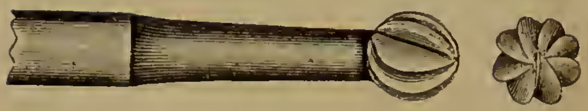
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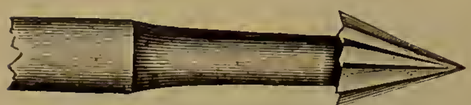
Wheel.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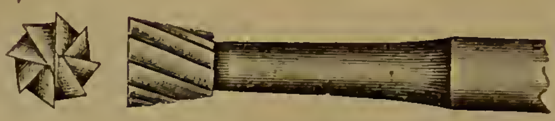
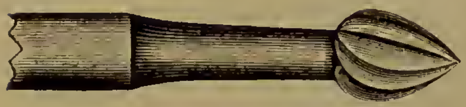
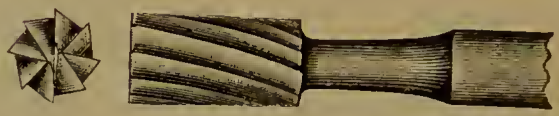
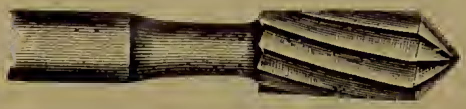
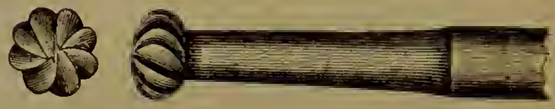

Inverted Cone.


Bud.


Fissure, Square End.


Fissure, Pointed.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Trade-Mark. Registered June 23, 1874, and July 3, 1894.

More Pure Para Gum to the Pound than any other.

Makes a Tougher Plate than any other.

Can be Vulcanized Thinner than any other.

More Economical than any other.

Put up in Enameled Metal Boxes, 1 lb., ½ lb., ¼ lb.

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S. S. White Dental Gum, No. 1 Improved.

Of a somewhat lower grade than Bow-Spring, requiring less care in vulcanizing, but carefully and properly made so as to produce plates of great strength.

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Equal in desirable qualities—color and toughness—to the best of the higher-priced brands. Put up in half-pound boxes.

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Of a more delicate shade of coloring than the regular Pink.

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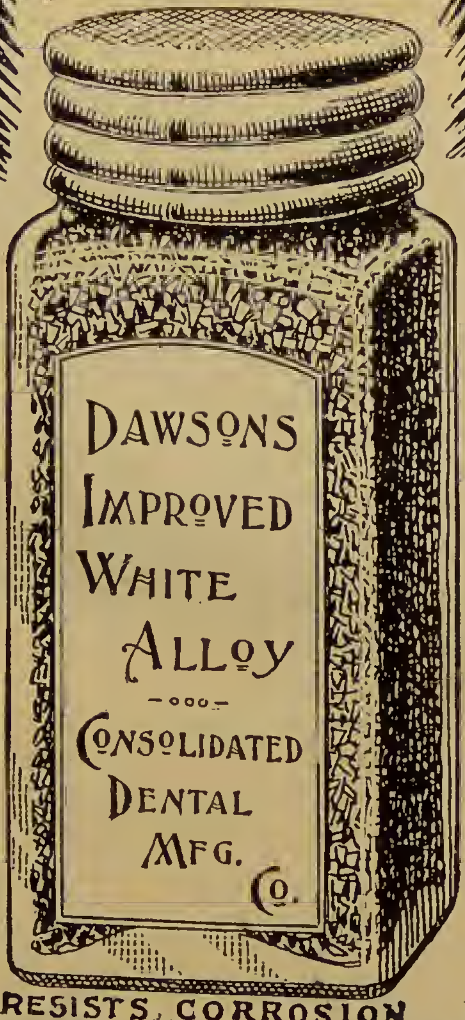

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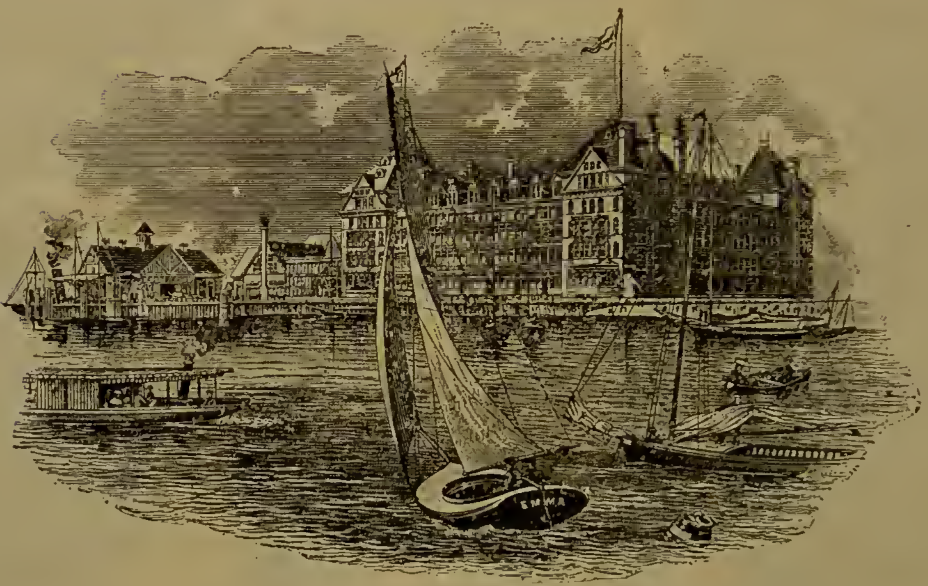

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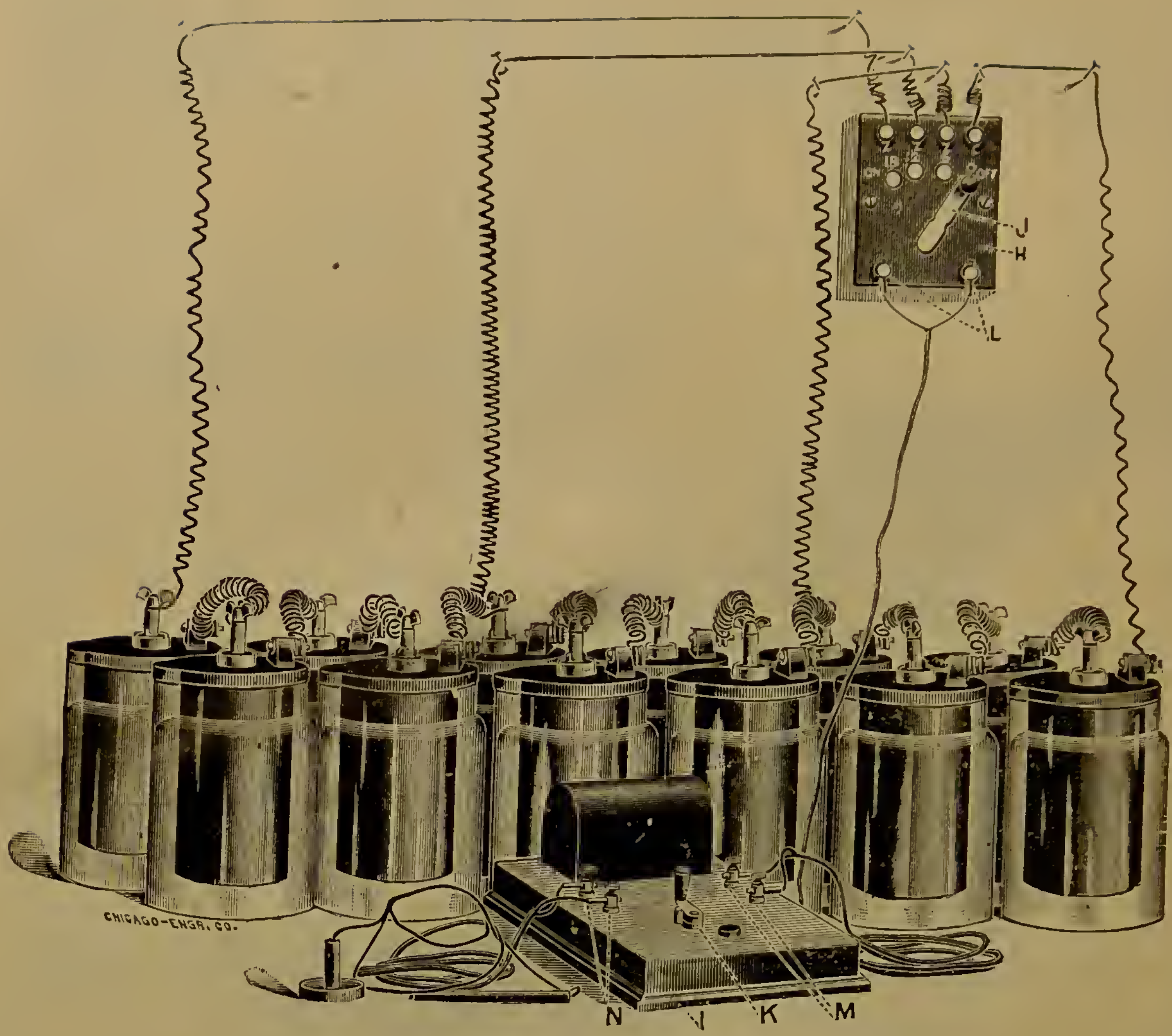

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COMPLETE WITH 18 CELLS

As there has been a considerable number of inquiries for our Cataphoric Outfit attached to battery we are pleased to announce that we can now supply the same as illustrated above; space prevents us from showing more than twelve cells in illustration, but the outfit is supplied with *18 cells*, affording a total of about 25 volts.

It will be noticed that 6, 12 or 18 cells can be brought into operation as desired, a most *important improvement* over other battery outfits on the market, and one which the dentist will quickly appreciate who has to operate on an inflamed pulp where a *low* voltage is *absolutely essential.*

The cells should be placed in some convenient closet and wires carried to the switch board (H), which, with the controller board (I), should be placed within convenient reach of the operator.

The method of operation is exactly similar to that performed with the direct current outfit.

Size of Switch Board 4 in. by 4¾ in. Size of Controller Board 9½ in. by 6½ in. Size of Battery Cell: Diameter 4½ in., Height 7¼ in.

Full directions sent with each Outfit.

Terms Cash With Order—30 Days Trial Allowed. If not satisfactory money refunded provided Outfit is returned in good condition.

The Dental Protective Supply Co.

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For 110 Volts
Direct
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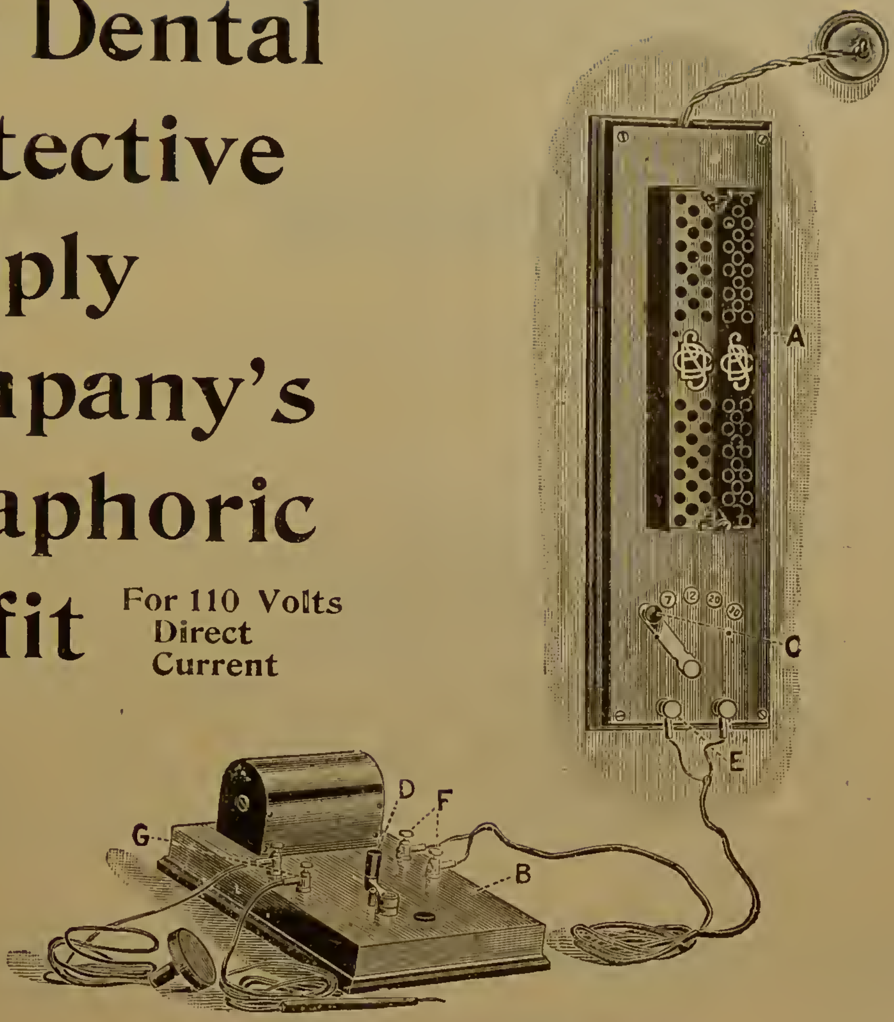

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By the use of our Cataphoric Outfit, illustrated above, the most sensitive dentine or live pulp can be painlessly removed, or bleaching performed.

The resistance board (A) should be hung on the wall, in a convenient position for operating—the controller (B) being placed either on your bracket, or if preferred in the patient's lap, and can be operated by either party.

By pushing the lever forward on the resistance board to point of first contact, 7 volts are conducted to the controller—by turning handle (D) you increase the voltage from nothing to a maximum of 7 volts by gradations of 1–10 volts.

Should stronger current be required, the handle on controller must FIRST be brought back to zero; the lever (C) can then be pushed forward to point of second contact when 12 volts will be conducted to controller, and so on to 30 volts. The simple movement of handle (D) will then be all that is necessary.
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